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Motor and Equipment Manufacturers Association Protects Diversified Interests

by A. Burdet Crofoot

George L. Brunner of the Brunner Mfg. Co. is to be the first president + +

RECOGNIZING that there is a certain diversity of interest among those manufacturing industries which serve the automotive industry, as well as a very close community of interest in its broader phases, the manufacturing members of the Motor & Equipment Association recently founded a new association which embodies a great degree of elasticity within a closely bound, tight-knit unit.

The new Motor & Equipment Manufacturers Association is a strongly cohesive organization with a comprehensive program that is designed to command the unified support of all branches of the industry, and through a plan of group activities, will permit its members who have interests common to themselves but foreign to the rest of the membership, to prosecute these interests with almost complete autonomy.

As outlined in the by-laws, the objects of the association are to foster the commercial interests of its members as related to the manufacture, sale, service, and use of fabricated and raw materials, component parts, machinery, tools and devices of all kinds in the automotive, aircraft, marine and related industries, and to secure the advantages to be obtained by friendly intercourse among members for their own welfare and the advancement of the trade interests represented, engaging particularly in the following activities:

1. Promotion of sales and market analysis.
2. Active investigation and promotion of export business.
3. Promotion of groups to study the problems of manufacturing and distribution of individual lines of products.
4. Organization and participation in trade expositions.
5. Providing a medium to ar-

Historical Background of M. E. M. A.

Motor & Accessory Manufacturers Association, organized by makers of parts, accessories and equipment and fabricators of raw materials entering into the automotive industry in 1904.

Automotive Equipment Association organized by automotive jobbers in 1915. Replacement parts and shop equipment makers admitted to affiliate membership shortly thereafter and still later admitted to full membership.

Two associations merged to form Motor & Equipment Association in late 1928.

Motor & Equipment Association becomes two separate associations, the Motor & Equipment Manufacturers Association and the Motor & Equipment Wholesalers Association, January 1, 1932.

The officers are men of wide experience in things automotive + +

C. C. Secrist of the Victor Mfg. & Gasket Co. is to serve as the secretary + +

bitrate difficulties between members.

6. Maintaining and operating a credit department which will furnish the most advanced type of information and service, covering automotive and allied industries in domestic and foreign markets through the cooperation and resources of members.

Specifically, the association has chosen as its objectives as a unit for the coming year the continued operation of "the best credit service available to the industry anywhere," participation in trade shows, continued cooperation with the National Automobile Chamber of Commerce to make their portion of the national automobile shows successful, "the closest possible cooperation with other automotive, aviation and marine industries," and the promotion of a successful program of group activities. The first four of these objectives are of vital interest to the complete body of its membership, and should be of sufficient importance to assure the welding together of the groups which will otherwise work more or less autonomously through their own groups.

Taking the unified objectives up one by one, the credit department will continue to operate, as it has practically since the inception of the old Motor & Accessory Manufacturers Association, serving as a clearing house for credit matters vital to the members, and conducting credit investigations of customers of the members.

The trade show to be held in Atlantic City, Dec. 7 to 12, will be handled jointly by the existing Motor & Equipment Association and the National Standard Parts Association, but the new manufacturers association, through the adoption of the second objective named, has pledged itself to continue this type of work next year.

Actually, of course, the ground work for the parts, accessory and equipment sections of the national automobile shows to be held in New York and Chicago in January, is being done by the old M.E.A. That organization, however, will have passed out of existence before these shows actually take place, and its part in the management of these sections will be carried on by the new manufacturers' association. Cooperation with the N.A.C.C. in the management of these shows will continue to occupy an important part of the plans of the new association as evidenced by the third stated objective.

As to further cooperation with other associations connected with the industry, the new manufacturers association will be an active supporting member of the Motor Vehicle Conference Committee, assuming in that body the position heretofore held by the M.E.A. It also plans to cooperate actively with the newly organized Motor & Equipment Wholesalers Association, as well as all other wholesale organizations within the industry.

Such activities as those outlined form the basis of a strongly cemented unified association that should be assured of every success.

Perhaps the greatest strength of the new M.E.M.A., however, lies in its plan for group activities, which allows for complete elasticity within the organization. Under this plan, any group of the membership, so desiring, may, with the consent of the directors, and subject to certain not too confining limitations, form an organized group within the main body for the purpose of fostering the particular interests of that group, and of acting upon such matters as pertain to

David Beecroft of the Bendix Aviation Corp. (above) will be vice-president

C. H. Burr of the SKF Industries will be guardian of the treasury

Officers and Directors of the New M. E. M. A.

President, George L. Brunner, Brunner Manufacturing Co.
Vice-President, David Beecroft, Bendix Aviation Corp.
Treasurer, C. H. Burr, SKF Industries.
Secretary, C. C. Secrist, Victor Manufacturing & Gasket Co.
General Manager, Albert H. Eichholz.

Board of Directors:

David Beecroft, Bendix Aviation Corp.
C. P. Brewster, K-D Manufacturing Co.
George L. Brunner, Brunner Manufacturing Co.
C. H. Burr, SKF Industries.
C. C. Carlton, Motor Wheel Corp.
F. S. Durham, Bonney Forge & Tool Works.
J. C. Ferguson, Eclipse Machine Co.
H. J. Lange, Marquette Manufacturing Co.
J. M. McComb, Crucible Steel Co. of America.
C. C. Secrist, Victor Manufacturing & Gasket Co.
Lothair Teetor, Perfect Circle Co.
F. G. Wacker, Automotive Maintenance Machinery Co.

the business represented by them. These groups may set up their own by-laws, elect their own officers, establish their own budgets and spend their own money. No group, however, can authorize the spending of money until its formal budget is adopted by the group and approved by the board of directors of the association, and the money or properly signed pledges in the hands of the treasurer of the association. All expenses of the various groups shall be financed by the group themselves, no call being allowed against the general treasury. Nor can any member be assessed for group activities without the written consent of that member. This last rule also applies to any special assessments of the association.

There are at present visualized five groups within the association, at least one of which is already organized and functioning. These groups are to be made up of manufacturers of original equipment, replacement parts, accessories, service tools, and shop equipment. Some of these groups, as they become organized, may have sufficient activity to require individual managers, operating under the association, and responsible to their own groups. Also, it may become advisable to organize sub-groups within the various groups for members whose interests lie with the groups, but who also have particular problems that do not concern the group generally. Thus it may come about that there is organized within the original equipment group a bearing sub-group, a wheel and rim sub-group, or a battery sub-group. And within the shop equipment group there might well be a lubricating equipment sub-group, a brake lining sub-group, and an air compressor sub-group.

The organization of the various groups is not necessarily limited to the five already mentioned. It is possible that some of the sub-groups which have been suggested may of themselves attain sufficient size, and their problems may become sufficiently diverse from those of the members of other groups to warrant their forming major groups themselves. There is no limit to the program any group may engage in, provided, of course the members of the group are willing to finance those activities and they do not run counter to the policies of the association. If, for example, the replacement parts group, or the replacement parts and shop equipment groups together, should decide to extend the "Care Will Save Your Car" campaign, so successfully inaugurated by the M.E.A. but at present suspended, and the members of this group should raise the funds necessary to carry on this extension, they will be at perfect liberty to do so. Or this group, working through a joint committee, might cooperate with members of the Motor & Equipment Wholesalers Association to extend this campaign. It will thus be seen that the activities of a group might easily become sufficiently diverse to warrant its employing its own manager to assist the association manager in that part of his work touching upon the activities of that particular group.

There is little danger that any of the groups will come to feel that their organization is so inclusive in its work as to obviate the necessity of it remaining members of the association. The expense of building up and operating a credit department at all comparable with that now in existence for the association, the prestige accruing from the trade shows, the recognition accorded through the handling of its portion of the national automobile shows, and the united front presented to the world at large will combine with the advantages of having the association to represent them in their contacts with other associations and the other factors of mutual interest to hold their wholehearted loyalty to the association.

It is thus as a strongly unified, cohesive unit serving the common interests of its membership, but allowing extreme elasticity within itself so that the diversified interests of its various members may best be served, that the new M.E.M.A. comes into existence.

Paris Salon Discloses Lower Price Level As Move to Stimulate Sales

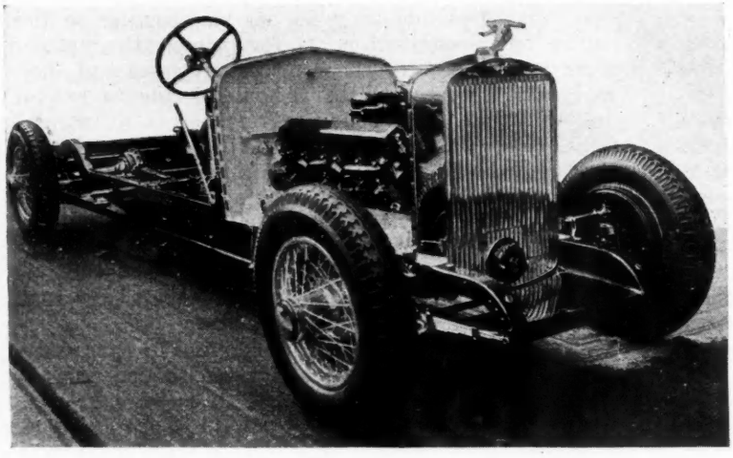
Overseas manufacturers are indifferent to free wheeling while American exhibitors use it as a major sales argument + + +

SMALLER and lower priced automobiles, in some cases produced by firms who in the past have built only expensive cars, stood as a feature of the twenty-fifth Paris automobile Salon and indicated the effects of the industrial depression. At a conference held during the show, Citroen dealers asked for a cheaper and less powerful car than the four-cylinder $1,000 sedan. The result was the decision to produce a four-cylinder of 2.83 by 3.94 in. bore and stroke, rating at 9 hp. under the French taxation scheme, and selling with sedan body at $876. The first model was produced within forty-eight hours and was on exhibition in the Grand Palais five days after the opening of the show. Before sailing for the United States André Citroen announced that production would be 80 per day within fifteen days, without interfering with the production of the two more expensive models.

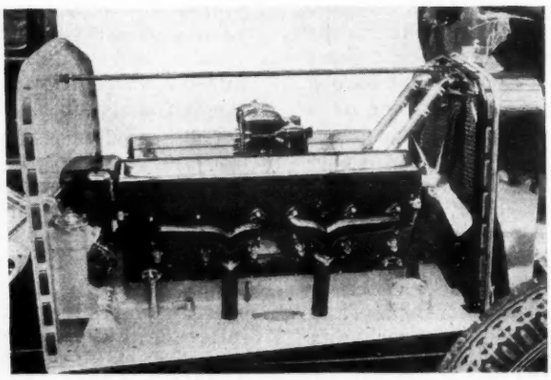
Renault came on the market with a new four-cylinder of 79 cu. in. piston displacement, having a French rating of 7 hp., and selling at $796. It was doubtless to meet this competition that Citroen was induced to make his quick change to a cheaper four. Mathis produced the first cheap eight, selling with sedan body at $1,800, and comprising many American parts and features in its composition, including a Warner free wheel and synchromesh transmission, a Stromberg downdraft carburetor, etc. Mercedes came into the field with a 104 cu. in. six having independent wheel suspension, synchromesh gears and selling at $1,000 on the home market.

Lancia dropped down to two smaller models than he has ever built before—a narrow V eight of 159 cu. in., and a four of 122 cu. in., both having independently sprung front wheels and a box type chassis to assure maximum rigidity. Donnet came into the cheap car class, with models selling as low as $600, by making use of the Violet twin cylinder two-stroke engine, other chassis features and external appearance being normal.

European manufacturers are sulking over the free wheel. Mathis has adopted it on all his models; the Chenard-Walcker Company, after introducing the free wheel in 1919, is offering it as optional equipment, and Emile Pilain has presented the Delavaux differential free wheel on a light car. All other makers either openly combat the free wheel or display indifference. American makers in the show, on the other hand, are featuring the free wheel and state

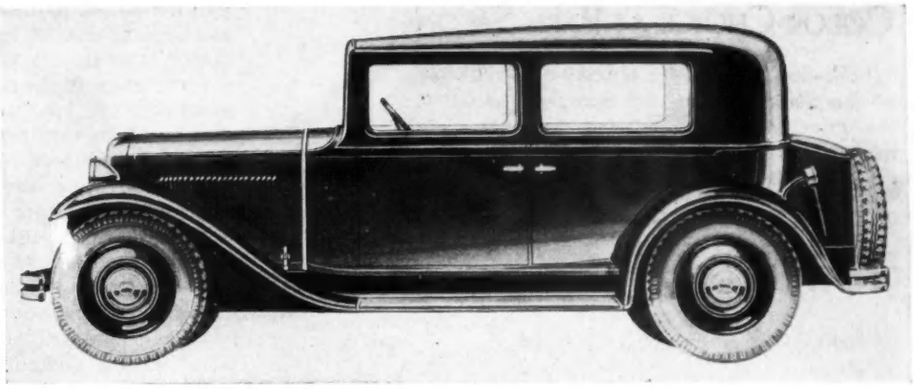


Hispano-Suiza twelve-cylinder chassis + + + + +

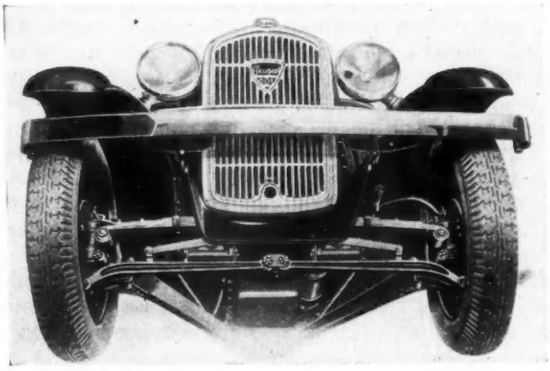


Hispano-Suiza twelve-cylinder engine. Housing on dash encloses steering gear

by
W. F.
Bradley



Renault low-priced four with conventional type radiator



Independently-sprung front wheels of new Peugeot model + + + + + + +

that they find it a powerful sales argument.

Independent wheel suspension has gained some ground and appears likely to make further progress in the immediate future. The most notable model is the Mercedes light six with transverse springs in front and dual coil springs at the rear. Lancia has continued independent springing of the front wheels on his two new models. The construction is of the same general type, the most notable change being the one-piece construction of a tubular axle with vertical tubular ends carrying the coil springs and oil pistons assuring suspension. The diagonal bracing to the chassis members, which is a feature of the bigger Lancia model, is abolished on the smaller types, thus lightening and cheapening construction and giving a more normal front appearance. Every effort has been made to secure an entirely rigid chassis. The main cross member, just behind the transmission, is welded up into a box section. From this, and going forward to the side rails, are two diagonal members, partially circular and partially box section, which give rigidity to the front end and also act as engine bearers. In the center of the chassis there is an X-member, the center of which forms a box through which the driveshaft is passed, and in which it has a steady bearing. The arms of the X-member, connecting up to the side rails, are of box section.

Lancia mounts the narrow-angle eight-cylinder V-engine on the diagonal members going from the cross member to the side rails, with double inverted cone rubber blocks interposed. In the case of the four-cylinder engine the mounting is by rubber blocks on two laminated springs, the leaves of which have Ferodo brake lining interposed. This gives a fully elastic mounting with a movement limited by the brake lining material and, it is maintained, entirely eliminates periods and vibration. In addition to the spring mounting of the engine there is a big Silentbloc attachment from the rear of the transmission housing to a rectangular section hollow cross member.

Engine design on the new Lancias follows previous practice. On the eight the overhead camshaft is driven by chain from the crankshaft, with an idler tensioning pulley interposed, this pulley, although eccentrically mounted, being made use of to drive the water pump. A downdraft carburetor is mounted direct on the head of the engine, with two short intake manifolds inside the valve stem chamber.

Peugeot has adopted independent springing for the front wheels of a cheap four-cylinder model it has had in production for a couple of years. The arrangement consists of a single transverse spring, the two main leaves having rolled eyes, with big diameter Silentbloc attachment to the head of the steering knuckle and below the spring and parallel to it a two-piece beam, with the outer ends pivoted to the bottom of the steering knuckle and the inner ends pivoted to an extension of the central bracket carrying the spring. In addition there is a triangular tie-rod construction from the two ends of the cross beam to a central point on the chassis. Hydraulic shock absorbers complete the equipment, and there is a separate transverse tie rod to each steering knuckle.

Harris Leon Laisne continues the tubular chassis construction with independent wheel suspension by means of levers working against blocks of rubber in cylindrical extensions of the chassis frame members. Cottin-Desgouttes shows no change on the system of independently springing all four wheels by means of transverse laminated springs.

The only new French front wheel driver is a cheap six-clinder Donnet, in which use is made of the Tracta type universal joint on the steering pivot and suspension is by means of two cross springs. These are held to the steering pivot by means of clips which embrace three main leaves. Brennabor has also come on the market with a comparatively cheap six having front wheel drive, the front suspension being assured by a

COLOR CHOICE AT PARIS SALON

Following is a table of the 589 cars exhibited at the Salon showing the number finished in the principal colors and the percentage of the whole.*

Black	129	21.9%
Blue	109	18.5
Maroon	71	12.05
Green	66	11.2
Beige	49	8.3
Ivory	48	8.2
Gray	38	6.45
Brown	33	5.6
Yellow	28	4.75
Red	18	3.05

*Duco Color Advisory Service

cross spring attached to the head of the steering knuckle, with anchorage at the bottom by means of an X-shaped forging pivoted to the chassis frame member. Bucciali is showing the same type of front wheel drive and independent suspension as last year, and Claveau has a front drive with a six-cylinder 2.60 by 3.15 in. engine.

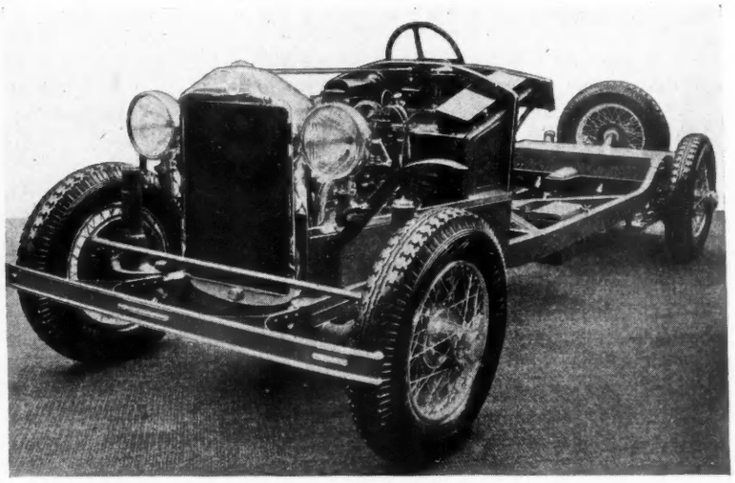
More attention is being given to improved transmissions, designed to facilitate gear changes. The Wilson planetary transmission with preselective gear is shown on the English Armstrong Siddeley cars and has just been adopted as optional equipment on the straight eight Isotta-Fraschini. Voisin is making use of the Cotal planetary transmission with magnetic control, as a reducing gear. The normal transmission contains only two speeds, but the planetary reduction gives four speeds, two of which are obtained by merely making an electrical connection. The Cotal four-speed planetary transmission with magnetic control is offered as a unit, but has not been applied by any passenger car manufacturer. Fleischel has added an automatic mechanism to the Cotal transmission, by means of which all gear changes are made without the intervention of the driver. The device consists of a mechanism measuring engine speed and the vacuum in the intake manifold. When engine revolutions and vacuum drop below a certain predetermined value, a finger is released which automatically brings another set of planetaries into engagement. The same mechanism can be applied to sliding gears if a servo motor is used.

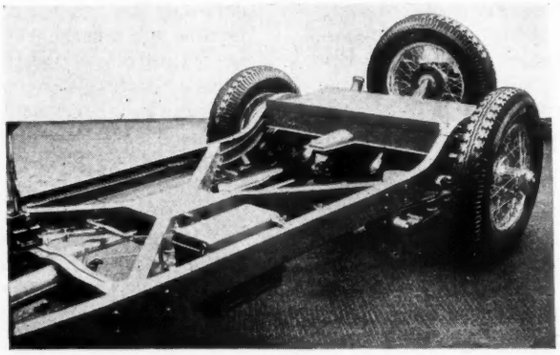
Synchromesh gears are employed by Mercedes on the new light six, by Horch on a new twelve, by Maybach, and by Mathis on the new straight eight model. While the big producers—Citroen, Renault, and Peugeot—are not offering silent thirds, these are general on all cars of the medium and higher classes.

Hispano-Suiza has come on the market with a twelve cylinder model, 3.94 by 3.94 in. bore and stroke, having aluminum cylinders, nitralloy liners and pushrod and rocker operation for the valves in place of the overhead camshaft used in the past. The engine is fitted with a downdraft carburetor and has dual battery ignition, with two vertical distributors mounted on the top of the crankcase and driven from the rear of the engine.

The difficulty of mounting the steering has been overcome by using double gearing in a single housing on the front face of the dashboard. Instead of the drop arm being mounted on the usual shaft, it is carried on a secondary shaft connected up to the steering wheel shaft by gearing. As a consequence, the steering gear does not in any way interfere with access to the engine. Final drive and reaction are taken through a torque tube with a spherical attachment to the main cross member. The rear springs have only one clip and the spring is anchored to the axle by means of a big-diameter bolt with a Silentbloc bushing.

On one of his models Delage has changed to double quarter elliptic rear springs with a shock absorbing device consisting of several short laminated springs

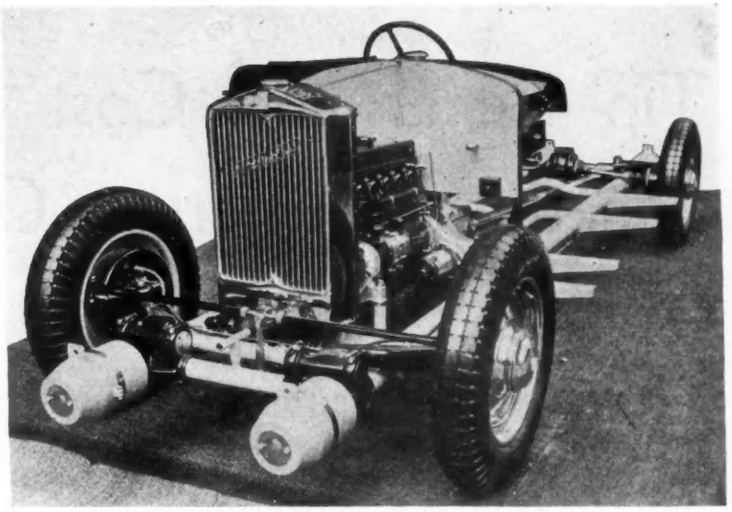




Diagonal braces have been eliminated from the front axle of the Lancia + + +

Box-frame construction of new Lancia eight + + +

held to the main spring by a clip and having a central screw to adjust the tension. On all his models he has shackled the front springs at both ends and fitted radius rods from axle to frame. The sports model of the straight eight, which has just captured the world's 24-hour record, has a special type of valve spring mounting. The valves are in the head, with the usual operation by pushrods and rockers. The usual rocker, however, only serves to open the valve, closing of the valve being assured by a second rocker, the fulcrum of which is not in the center. The spring, which is on the top of the shorter end of the rocker, has a much smaller number of coils and is of much bigger diameter than if mounted on the valve stem. Whereas with the normal type of coil spring surge set in at about 3500 r.p.m. the heavier-gage external spring enables the speed to be carried up to 4500 r.p.m.



Harris Leon Laisne with rubber chassis suspension

Horch shows a new twelve-cylinder model of 3.15 by 3.94 in. bore and stroke, this being an L-head model with single camshaft, downdraft carburetor and battery ignition. Sleeves are fitted round the exhaust pipes running along the top of the cylinders and slots in the front of these allow air to enter from the radiator fan. This warmed air is made use of for the carburetor and also by a mechanical connection at the end of one of the sleeves it can be carried into the body of the car or directed over the outer face of the windshield to prevent the formation of ice. This car has synchromesh gears for second, third and fourth speeds.

The Pescara straight eight, which originated at Barcelona, is now about to be built in the Voisin factories near Paris. This is a sporting model of 183 cu. in., with aluminum cylinders having nitralloy liners, two overhead camshafts, Stromberg downdraft carburetor, Delco ignition and Lockheed brake equipment. Hood, fenders and body are all built of silumin.

There is an increase in the use of Bendix mechanical brakes, and a decreased use of the vacuum servo brake. Citroen is among the leading French makers having made this change.

Hydraulic shock absorbers show a considerable gain over the friction type, Lovejoys being among those employed in increasing numbers.

As in previous years, General Motors declined to take space in the Paris Salon. American firms having booths on the ground floor were Auburn, Chrysler, De Soto, Dodge, Duesenberg, Ford, Franklin, Graham, Hudson, Hupmobile, Lincoln, Nash, Packard, Pierce-Arrow, Reo, Studebaker, Willys-Knight and Willys-Overland.

Test of Pneumatic-Tired Rail Car

THE Michelin pneumatically-tired rail car which was described in *Automotive Industries* of August 22, was demonstrated in a run from Paris to Deauville and back. This run is made by the ordinary express trains in 2 hours 47 minutes, while the "Micheline" made it in 2 hours and 3 minutes or at an average speed of 66 m.p.h. The running was excellent and there was far less noise than in a train. The car was equipped with an Hispano-Suiza engine with a tax rating of 46 hp. but probably capable of developing more than 100 hp. The weight of the rail car used was 9250 lb. It is stated that orders for pneumatically tired rail cars have been placed by three of the French railway lines.

From another source we learn that the French Eastern Railway has placed orders for 30 of these rail cars, which carry 24 passengers each and are 42 ft. 8 in. long over all. They are carried on ten wheels in two groups of six and four respectively. The front group of six has a wheelbase of 6 ft. 8¾ in. Four of these six wheels are driving wheels, the main drivers being coupled to the leading axle by roller chains. The trailing wheels of this truck merely act as carriers. A Panhard-Levassor engine of 27 hp. tax rating is used. The trailing wheels are arranged in a truck of 4 ft. 7 in. wheelbase. The car has a central compartment 21 ft. long for passengers, two baggage compartments of 210 cu. ft. capacity, and at the front end an engine and operator's compartment.

ACCORDING to a leaflet issued by the Cummins Engine Company of Columbus, Ind., the Indiana truck equipped with Cummins Diesel engine which recently made a trip from New York to Los Angeles, weighed 16,000 lb. complete with load, carried a pay load of 7000 lb. and ran a distance of 3214 miles. The total elapsed time was 125 hr. 52 min., the actual running time, 97 hr. 20 min., the average speed for the entire run, 33.02 m.p.h., and the fuel consumption, one gallon per 15¾ miles. The total fuel cost was $11.22, making the average cost of the fuel 5½ cents per gallon and the specific fuel consumption, 0.1 cent per ton-mile of pay load. The engine is a six-cylinder one and is said to develop 125 hp. at 1800 r.p.m.

Tip Relief and Cost Finding Discussed Meeting of American Gear Manufacturers

Economic problems of the gear industry were given considerable attention at the Pittsburgh Meeting of the A. G. M. A. + + + +

TIP relief was the chief topic in the technical discussions at the semi-annual meeting of the American Gear Manufacturers Association, which was held at the William Penn Hotel, Pittsburgh, Oct. 15-17. Two papers dealing with this subject from somewhat different points of view were presented by T. R. Rideout, who is connected with the Nuttall Works of the Westinghouse Electric & Manufacturing Co., and R. E. Peterson of the Research Department of the same company.

P. C. Day of the Falk Corp., Milwaukee, read a paper on "Good Practice in the Manufacture of Speed Reducers," in which he analyzed some of the basic problems arising in the development of a line of such reducers. According to Mr. Day, the speed reducer has become almost indispensable for the transmission of power from prime movers to industrial machinery, but designers and manufacturers of such reducers are confronted with a number of tough problems, which result from the great diversity of operating conditions, not only as regards the nature and continuity of the loads to be carried, but also as regards the extreme variations of climate and surrounding temperatures under which the reducers must function. Generally, a superior product is wanted at a reduced cost, and the only way in which this demand can be met is by standardization and quantity production.

As at other recent meetings of the association, considerable time was again devoted to commercial problems of the industry, and particularly to the accurate predetermination of manufacturing costs. Both the morning and evening sessions of the second day were devoted to this subject, and several papers on different phases of it were presented.

While reports were made by nearly all of the divisions of the technical standardization committee, these were of progress only, and no definite action was taken on any new proposed standards.

The attendance was quite satisfactory, considering the times, and while a survey made at the meeting showed that the gear industry is operating on a considerably curtailed scale, a spirit of optimism prevailed which found repeated expression in the statement that "the bottom must have been reached." The association will hold its next annual meeting in Cleveland during the second week of May.

The meeting of subcommittees of the General Standards Committee on Thursday evening was preceded by an address by the honorary president, F. W. Sinram, on the subject "How the A.G.M.A. Has Benefited the Gear Manufacturer." Mr. Sinram said the greatest advantage accruing from membership in the association was the opportunity it afforded for increasing friendships with men in the industry. No gear man, he said, could afford to miss a meeting of the A.G.M.A., as every one of the gatherings since its inception had witnessed presentations on a wide variety of subjects, all pertinent to the gear business, many of which had been distinct contributions to the art. Mr. Sinram quoted the late Frank Burgess of the Boston Gear Works to the effect that he never attended a meeting of the A.G.M.A. without securing several new ideas which more than repaid him for the time and money spent in making the trip.

The discussions in connection with the formulation of gear standards, Mr. Sinram said, relate to design, production and application, and they cover every type of gear. Every member has the opportunity to listen to the deliberations of many of the best minds interested in the art and to contribute to them.

The speaker further dwelt on the work done by the association with the object of bringing about uniform methods of cost accounting and the use of a standard form of proposal in the gear industry, as well as to the plan, inaugurated a year ago, of collecting and disseminating statistics and general information concerning the activities of the industry.

In concluding his talk, Mr. Sinram emphasized a statement made by him in an address many years ago and which has since become a slogan of the association, that "the success of the A.G.M.A. is the responsibility of each and every representative."

Tip Relief Arouses Interest

When two involute gears with accurately spaced teeth of correct profile run together, the transmission occurs theoretically without shock and without variation in speed ratio, hence the gears should function smoothly and silently. In practice, however, there are errors of spacing and of profile in all gears, and in addition, gear teeth deflect under the bending load on them, and they also deform as a result of compressive loads on the tooth-contact areas. These variations from theoretical conditions result in a gouging action when the teeth first come

at Semi-Annual Association

by P. M. Heldt

into contact, and a scraping action when they disengage. The remedy for such faulty action is tip relief, that is, an easing off of the flank of the tooth from a point somewhere between the pitch circle and the top circle to the top of the tooth. Tip relief has the effect of delaying contact between meshing teeth and, therefore, shortens the arc of action; hence, if it is carried too far, there may not be sufficient overlapping of the periods during which load is carried by successive pairs of teeth, and the gear may be noisy. The various forms that may be given to tip relief and the amount of relief desirable under different conditions were discussed in the two papers mentioned, which were presented and discussed together. It is planned to print these papers in an abbreviated form in future issues of *Automotive Industries*.

In the discussion of these papers, B. F. Waterman said that in the old form cutters the main, involute portion of the tooth was provided with an epicycloidal extension which provided the necessary tip relief. Later on, when hobs came into general use, it became the practice to give the tips of the teeth a pressure angle of 17 deg. instead of 14½ deg.

Two Degrees of Tip Relief Suggested

W. G. Fisher of the General Electric Co. said that in railway work pure involute teeth gave signs of interference, and he had tried various forms of tip relief, but used it only on the gear (not on the pinion). Of course, it is desirable to be able to use the same hob for the pinion and the gear, but this becomes impossible if the gear is to have tip relief and the pinion none. B. F. Waterman said in this connection that with a given provision for tip relief on the hob, the actual relief will be less on the gear with the smaller number of teeth (the pinion), and he thought that the requirements for tip relief could still be met by using the same hob for pinion and gear. It was suggested that two degrees of tip relief were required, one for unhardened or ground gears only, and the other for heat-treated gears. When gears are heat-treated after the teeth are cut there is likely to be an additional error which may be either positive or negative. It seemed to be the consensus of opinion that the errors due to heat-treating are the most serious. In reply to a question from Mr. Waterman, Mr. Peterson said the deflection due to load along the line of action was ordinarily less than 0.001 in. per 1000 lb. tooth load per inch face. His recommendation for the determination of the interference that must be provided against by tip relief was "twice the maximum pitch error, with something added for deflection." In automotive gears, he said, the pitch error would vary from a few ten thousandths inch to several thousandths inch.

A. A. Ross said he was an enemy of tip relief. Mr. Rideout had shown that we had to have it, but we should be sure not to overdo it. "When we put in tip relief, one tooth carries the full load practically all the time, and that means rough and noisy gearing." Mr. Rideout pointed out that tip relief was not eradicated by wear of the teeth, though it might be slightly reduced thereby, which was probably due to the sliding action on the relieved surface.

W. E. Sykes, referring to Mr. Ross' remark that he was an enemy of tip relief, said that in turbine work, in which Mr. Ross was interested, tip relief was not required, owing to the comparatively light loads carried by such gearing. But in certain other classes of gear work, where the tooth loads occasionally were very heavy, tip relief was an aid. For instance, in motor-truck drives the tooth load was quite heavy, particularly during periods of acceleration, and in one case in his experience a very harsh note had been obtained from gears without tip relief, which had been eliminated by providing relief.

The point was made that even aside from considerations of tooth errors and tooth deformation under load, it might be desirable to have tip relief, because the sharp top corner of an unrelieved tooth had a tendency to scrape the oil off the mating tooth when contact first occurred. With tip relief, there is a wedging action on the oil film which is known to be beneficial from thrust-bearing practice.

A. H. Candee of the Gleason Works said that in bevel gears tip relief results from the slight deviation of the cutter curve from the true involute, and when examining a pair of gears after running them together one can see where the contact fades away near the top of the teeth. B. F. Waterman observed that if tip relief was too great the top of the tooth might just as well be cut away entirely, and the general opinion seemed to be that it was better to have too little than too much relief. D. T. Hamilton of the Fellows Gear Shaper Co. expressed the opinion that tip relief should be different for every pitch and

for every ratio, and that it would be found practically impossible to standardize it.

Uniform Cost Accounting

J. B. Sehl, cost agent of the American Drop Forge Institute, spoke on "The Practical Application of Uniformity in Cost Practice for an Industry." He explained the system which has been worked out by the institute and is in use by about 75 per cent of its members. By this system costs are broken down into numerous items that are independently variable, so that the actual cost can be predetermined in each case with a relatively high degree of accuracy. One point on which some discussion arose was the setting of the normal working hours per year, and of the machine-hour rate dependent thereon, in the case of more or less special machines for which there is only limited use. As an example of such machines in the drop-forge industry the coining press was mentioned. This press is used for restamping such parts as automobile connecting rods, which must be very close to size, and accurate duplicates. The machine-hour rate is then set on the basis of a reasonable percentage of the full shop working time, so the rate will not be excessive, and the unabsorbed portion of the burden on the machine (due to its standing idle a good deal of the time) is charged to profit and loss.

Another point that aroused some discussion is that sales and executive expense and profit are figured (in the Drop Forge Institute's system) not as a percentage of the total manufacturing cost, but on the basis of the machine-hours of work on the product. Thus the charge for sales cost, administrative expense and profit is the same in the case of a forging of alloy steel as in the case of a similar forging of carbon steel. There was some disagreement as to the soundness of this practice, and J. Harper Jackson of the Pittsburgh Gear & Machine Co. remarked that if the salesmen were on commission the sales expense would be in direct proportion to the total cost of the product, material included, while if they were on a straight salary they would probably point to the total volume of business turned in by them when asking for a rise.

Standardized Specifications

A. A. Ross, chairman of the General Standards Committee, in his report said that at the last previous meeting it had been suggested by a member that the A.G.M.A. should have a standard blank which would show what a purchaser should specify when asking for a bid or when ordering any particular type of gear, and that the standards committee draw up such a blank. Accordingly, an item Requisition Blank had been added to the programs of the various subcommittees dealing with specific types of gearing. M. T. Schumb, chairman of the Library Committee, agreed to gather samples of such requisition blanks now in use by member companies, which might serve the committees as guides in arranging their standard blanks.

A letter was read which had been addressed by Dr. Sanford A. Moss, vice-chairman of the Sectional Committee on Scientific and Engineering Symbols and Abbreviations of the American Standards Association, to A. A. Ross, chairman of the General Standardization Committee of the A.G.M.A., in which it was stated that an agreement had been made to the effect that a few people from the Sectional Committee on Symbols should be appointed to work with the Subcommittee on Nomenclature of the Sectional Committee on Gearing, so as to correlate the list of gear symbols with all of the other lists of symbols, introduce the point of view of symbols specialists, and make the necessary arrangements to include the Gear Sectional Committee list of symbols with all of the other lists of symbols arranged by the Symbols Sectional Committee.

Dr. Moss, Major Earle Buckingham and Charles Logue had been appointed by the Symbols Sectional Committee to work with the Subcommittee on Nomenclature of the Gear Sectional Committee.

It is expected to make the present system of symbols and abbreviations of the A.G.M.A. consistent with the other lists of symbols of the Symbols Sectional Committee, if any changes are required to make it so, and also to add a list of symbols for stresses in gears, which are not included in the present list of symbols.

Manganese Range of Case-Hardening Steel

Chester B. Hamilton, chairman of the Metallurgical Committee, reported that some difference of opinion had arisen with regard to the proper manganese range for the low-carbon, case-hardening gear steel corresponding to the S.A.E. No. 1020, and he had had a conference on the subject the previous day with Mr. Lynch, chairman of the A.S.A. Sectional Committee. The S.A.E. manganese limit is 0.30-0.60. The objection is to the 0.30-0.40 part of this range, and is based on the argument that if the steel does not contain any more manganese than this there is a possibility that an insufficient amount of ferromanganese was added to the heat. The manganese acts chiefly as a purifier, and some of it passes off with the dross, so not all that is added to the heat is accounted for by the analysis. If insufficient manganese were added the steel might not be properly purified, and therefore be a poor steel for case hardening.

There were two alternatives to the S.A.E. range, viz.: 0.40-0.60, to which objection was raised by the steelmakers, however, as not giving them sufficient leeway, and 0.40-0.70.

W. H. Himes, chairman of the Worm Gear Committee, in his report went over the original program of this committee and said that a number of the items had been dropped as not suitable for standardization. Among these, it may be noted, was automotive worm gearing. At the last two meetings he had reported experimental work carried out to obtain a basis for a standardized load-rating formula, but this work had been dropped temporarily owing to the check imposed by business conditions on expenditures for research. He mentioned that the committee had compiled a worm-gear nomenclature which included 51 terms. Ten of these terms had been included by the Nomenclature Committee in its general nomenclature of the gear art, the remaining 41 being of a more general nature, applying to all forms of gearing. Mr. Himes asked whether this special worm-gear nomenclature should not be dropped, but the sentiment of the meeting was that it should be continued for the present.

At a meeting of the Worm Gear Committee on the previous day a change with respect to pressure angles had been suggested. In the present A.G.M.A.

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JUST AMONG OURSELVES

Elusive Facts of a Royal Accident

EVER since the Prince of Wales, driving his new Burney rear-engined car, collided with a car driven by a beautiful actress some months ago we've been curious to learn the details of just what happened to the Prince's automobile as a result of the crash. Along with the great interest in rear-engined cars over here many of our engineers have expressed doubts as to what might happen to passengers or to the vehicle itself in case of a head on or a rear-end collision. The accident to the Prince, it seemed, might furnish some indication of an answer to this question; at least it was the first authentic crack-up with a rear-engined car to come to our attention.

Getting detailed information on the subject proved extremely difficult, however, our regular correspondent in England having been unable to dig up very much, owing to the desire on the part of authorities over there to have as little said about the matter as possible. Up until today, in fact, a newspaper picture of the actress involved was the sole trophy of our chase after information.

Finally we have managed to get a little added information from a confidential source, which probably will be of interest to our readers. Our informant, though he must go nameless, is quite competent as regards automotive engineering matters.

And Finding It The Search is Still On

THE Prince's particular accident, we are informed, doesn't really offer much evidence as regards the "crash-resisting" qualities peculiar to a rear-engined job because the Prince's car came out of a side road and was hit broadside by the other car—a conventional design with engine in front.

The damage sustained by the Prince's car, it appears, consisted of broken panels on the offside front and rear doors. Apparently the frame was not damaged. The fact that the Prince's car was shipped to France within a week following the collision, indeed, indicates that it did not suffer serious harm.

Anyhow, it looks as though we'd have to wait for another accident to provide specific evidence on this subject.

Bank Crashes Open Sales Opportunities

THOUSANDS and thousands of individuals have taken cash out of banks in the last three months and put it into cold storage in safe deposit boxes. The psychological and practical reasons for this are obvious. It's a bad thing for business in general, but has been considered a necessary safety measure by many individual depositors. When two or three banks in a small town—or ten or fifteen in a large city—close their doors within a few weeks, the people in that community are bound to be uneasy; confidence is bound to be shaken temporarily in the safety of depositories.

What a chance for salesmen!

If a man's money is in material things which he can use and enjoy, it is perfectly safe and it's working for him efficiently. How many people have thought to themselves recently, "If only I had bought that automobile instead of leaving my money in that savings account in a bank which went blooey I'd at least be having the fun out of the automobile still. Now I'm just hoping for 20c on the dollar!"

Just a Thought— That is All

WE don't promote the foregoing as a direct sales argument. We merely mention it as an underlying thought which we believe has made prospects out of many people today who were not prospects three months ago; people who haven't a dime more money today than they had then—but who had some then.

And after all the people who have been laying away money in safe deposit vaults are, for the most part, people who really have something to lay away. The small depositor on the average never thinks about banking safety until a couple of failures occur in his home town.

The Salesman Can Doctor the Situation

RUSSEL PAIGE, Dodge sales manager in Canada, said the other day that it might be better in these times if sales managers and salesmen didn't know too much about economic trends. His idea is that too much study of why business is bad slows down the drive and the sales punch necessary to make it better.

"I believe we men in the sales end of the business can do a great deal in restoring optimism and renewed buying spirit," Mr. Paige is quoted by a newspaper as saying, "by chasing the timid dollar out of its dugout."

Mr. Paige is right. Selling should be aggressive between now and January 1. Profits are still to be made in 1931.—N.G.S.

Transmission Requiring Shifting Is Seen As the

by Athel F.

Definite advantages possessed by the vacuum-operated clutch over the mechanical type of free wheeling are the greater simplicity of the lock-out mechanism and the distinct protection against engine stalling that it provides + +

IT now seems that free wheeling will be available on virtually all 1932 cars. While this development is interesting in itself, it also reflects the high degree of interest with which engineers have been regarding the amidships section of the automobile. Although free wheeling may be considered as an end in itself, in the light of recent history and of engineering plans for the immediate future, it is only one of a series of improvements in the power-control units of the automobile.

It is not idle speculation to forecast that within a few years cars will be offered on the domestic market without clutch pedals or gearshift levers as we now know them. Ever since the introduction of silent-third four-speed transmissions a few years ago, the front compartment of the automobile has been headed for greater simplification of controls. In the meantime—during the evolutionary stage—additional complications in control mechanisms have had to be adopted. Each of these so-called complications justifies itself not only by providing more satisfactory car operation, but also by establishing a new base from which further steps in the development of the power control units can be taken.

Modern-type four-speed transmissions called for constant-mesh gears. Constant-mesh gears made synchromesh transmissions and free wheeling feasible. The former provided still better shifting, and the latter, aside from other considerations, made decreased use of the clutch pedal possible. The combination of synchronizing units with free wheeling was a further step, a development that is being extended to more cars for 1932. Removing the free-wheeling unit from inside the transmission and placing it at the rear made possible shifting into all forward speeds without declutching, except in starting up. Shifting into low gear may also be made easier by the adoption of constant-mesh gears for this speed range, although this development is likely to remain restricted to the higher-priced cars.

Considering the free-wheeling car of today, the engineer readily sees two possibilities for further improvement, namely, elimination of the clutch pedal so far as normal driving requirements are concerned, and simplification of the lock-out mechanism of the free-wheeling unit; in a number of cases this has directed his attention to the clutch.

There are still a considerable number of engineers who are strongly opposed to the principle of free wheeling, but in several instances management, as a result, apparently, of public demand for the device, has overruled their objections. To these engineers, also, the clutch offers a means of simplifying the handling of a car as an alternative to free wheeling.

Automatic Clutch Throwout

Semi-automatic or automatic operation of the clutch throwout mechanism is, of course, the point under consideration. Already there are some half dozen or more companies actively engaged (or about to engage) in selling vacuum-operated or centrifugal types of clutch-throwout mechanisms to the replacement trade for use mainly on older cars having no free-wheeling unit; and at the time of writing there are a number of chassis models tentatively scheduled to embody an automatic clutch control for 1932.

Automatic clutch-operating mechanisms that are being considered with favor by engineers in this country today are either of the centrifugal or the vacuum-operated type. Hydraulic clutches have made only little headway here. The centrifugal clutch is not claimed to be a substitute for mechanical free wheeling. It is mainly a means for disengaging the clutch when the car is brought to a stop. Its greatest possibility at present seems to be on cars equipped with free wheeling, since it makes it possible to eliminate the use of the clutch pedal under the conditions of starting from a standstill and reversing. Centrifugal clutches generally operate by means of weights hinged to the clutch driving plate or flywheel, in such a manner that when the engine is speeded up the centrifugal force acting on the weights increases the pressure on the driving plate through an arrangement of levers, thus bringing about engagement. In this type the springs are

Very Little or No Manual Next Logical Development

Denham

The centrifugal clutch is mainly a means for disengagement when the car is brought to a stop. Its greatest opportunity seems to be for use on cars equipped with free wheeling + + + + +

so arranged that the clutch is normally in a disengaged position, which is the reverse of the customary arrangement.

It should also be possible to design a centrifugal clutch to actuate the pedal hook-up rather than the plates alone, an arrangement which has definite advantages if not used in combination with free wheeling.

Centrifugal clutches in experimental installations are generally designed to produce engagement when the clutch speed has reached 400 to 600 r.p.m. At any speed above this the clutch is positively engaged. Below this speed, disengagement is also positive. It is the driven plate of the clutch, however, which regulates the degree of engagement at low speeds, as may readily be seen. Assuming the car to be at a standstill, the accelerator is depressed. As the engine reaches the normal engagement speed for which the clutch is designed, the driving plate will attempt to engage. But since the engine cannot be speeded up beyond 400 to 600 r.p.m. until the vehicle has reached a corresponding speed, the clutch will slip at a definite rate until the vehicle speed has reached synchronism, thereby providing a virtually "standardized" engagement. The rate of engagement is practically independent of the coefficient of friction of the lining, and the pressure between the clutch plates increases with the speed of the car.

Another obvious advantage of the centrifugal type of clutch is that it reduces the tendency of the engine to stall. Since there is a gradual engagement at low speeds, reduction in speed of the engine results in disengagement of the clutch, removing the load from the engine.

Running Balance with Centrifugal Clutches

The major problem in connection with centrifugal clutches to date has been the obtaining and maintenance of a good running balance. Accurate machining and assembly of the actuating weights and mechanism are obviously necessary to avoid overloads on clutch bearings from out-of-balance conditions. This problem is particularly serious in the service field, since the service man may be called upon to carefully match weights.

Adequate means must be provided for taking up clutch wear. It also seems that a special clutch facing with a low coefficient of friction, impregnated perhaps with a lubricant such as graphite, is highly desirable, because of its tendency to reduce grab and to lessen the rate of wear. The problem of increased loads on the throwout bearings apparently is not as serious as is sometimes thought to be the case. Antifriction bearings of generous size are desirable, but little trouble has been experienced even with the antifriction bearings at present used for this purpose. This is probably due to the fact that car manufacturers already have provided adequate bearings to take care of that great proportion of the driving public which insists on "riding the clutch."

Under normal service conditions smooth engagement appears to be a bit easier to obtain with the centrifugal than with the vacuum-operated types. However, the latter are receiving more attention from both automobile manufacturers and the replacement trade, because they necessitate little if any change in the clutch itself, and they also lend themselves as substitutes for mechanical free-wheeling units.

Actuating controls for the vacuum-operated clutch differ according to whether the clutch is intended to provide free wheeling or not. If free-wheeling characteristics are desired, the basic control is embodied in the accelerator pedal. By removing the foot from the accelerator, the latter, either through a mechanical or electrical connection or automatically by change of pressure in the manifold, operates a valve permitting the intake manifold vacuum to retract a piston in a cylinder, the piston in turn being connected to the clutch pedal or some other part of the clutch throwout mechanism. When the accelerator is again depressed, the valve reverses and shuts off the vacuum line, permitting it to return and thereby to engage the clutch.

The automatic type referred to above depends for its action on large changes in manifold pressure. Small

changes do not affect the primary control; it is of the on-or-off type, and adjustment means are provided in the lower end of the actuating cylinder. In this type "coasting" would be virtually automatic in going down a hill if the accelerator were released, and a cut-out mechanism apparently would have to be installed for ready lock-out of the free-wheeling action, perhaps through a foot-operated button.

In the non-free-wheeling type of vacuum-operated clutch, engine speed regulation of the engagement appears to offer the greatest advantages. This may be effected by a number of different methods, such as through a relay on the generator actuating the control valve through solenoids, or through a tachometer-type of connection. There may have to be also a supplementary mechanical or electrical control, actuated by the gearshift lever, to bring about clutch disengagement, for shifting in an installation where a mechanical free-wheeling unit is not also provided. If electrical controls are provided these should go through the ignition switch, to prevent drain on the battery when the car is not in use. A third control might have to be provided, connected, perhaps, to the accelerator pedal, for clutch reengagement after shifting. On the whole it would appear that in the present stage of development of the transmission, and in consideration of apparent present-day public demand for free wheeling, this type of vacuum-operated clutch has its best possibilities in combination with a free-wheeling unit.

Vacuum-Operated Clutch is Favored

It is the free-wheeling type of vacuum-operated clutch, however, that is receiving the major attention. One definite advantage possessed by the vacuum-operated clutch over the mechanical type of free-wheeler is the greater simplicity of the lock-out mechanism. With the vacuum-operated clutch, pushing or pulling out a button control or adjustment of the hand-throttle position is all that is necessary to render the free-wheeling action ineffective, shutting off the vacuum line. The vacuum-operated free-wheeling clutch also provides a distinct protection against engine stalling, as long as the car is in motion. If the engine stalls, the vacuum drops and the clutch reengages to start the engine. When thus used, the major problems which present themselves include the following:

1. Clutch engagement must be sufficiently fast for the quick get-away expected by motorists in the present-day automobile.
2. The engagement must be sufficiently soft so that parking difficulties will be minimized.
3. Disengagement must be sufficiently rapid so that when the foot is removed from the accelerator pedal for free wheeling there will be no interval of engine drag on the car.
4. When coming back out of free wheeling there should be a non-jerking engagement.
5. The mechanism should provide for variations in engine friction.
6. The clutch must be sufficiently free from drag to permit shifting.
7. For rapid shifting it is desirable to provide means for overcoming the inertia of the gear train any clutch-driven plate.
8. Provision should be made to allow for frictional changes in clutch plates in service.

Before considering these problems it should be pointed out that if all the desired characteristics can be provided it would make possible the total elimination of the clutch pedal, except for one factor. Many states prohibit coasting on hills, and unless these provisions were overruled, the clutch pedal would have to be retained so that the car could be normally operated with the vacuum control "locked out." Further developments in transmissions may overcome even these objections.

It is the writer's opinion, however, that at the present stage of the art, complete elimination of the clutch pedal is not feasible without an extremely fine balancing of the factors involved in clutch operation, even neglecting the legal and possible safety considerations.

Automatic clutch installations have been made, however, in which the pedal is replaced by a foot button which locks the automatic feature in or out. In case of failure of the mechanism, the clutch would probably remain "permanently" engaged.

Considering the first two problems, engagement conditions for get-away and parking, and the further requirement that the variation must be effective in the small distance of clutch plate travel which marks the difference between complete engagement and virtual disengagement, it appears that either a compromise must be effected or else a supplementary control must be provided.

If a compromise type of engagement is to be used, an adjustment must be provided to suit the needs of different drivers and to take care of clutch variations in production and as a result of service operation. Such an adjustment is desirable in any case. There is the possibility, however, of incorporating a variation in the speed of engagement for low and reverse speeds on the one hand and second and high on the other.

A slow or soft low speed and reverse engagement would take care of parking conditions, while a faster engagement would fit in well with the growing custom of starting up in second and high. This could be done by providing variation in engagement either through transmission position or through accelerator position. The difference in engagement speeds could be readily obtained by variation of the air bleed in the cylinder proper, in a dashpot used in conjunction with the vacuum cylinder, etc. A dashpot or its equivalent appears desirable for the purpose of dividing the clutch plate travel into two steps—a rapid motion from the fully-out position up to the beginning of engagement, and a slower motion from there on.

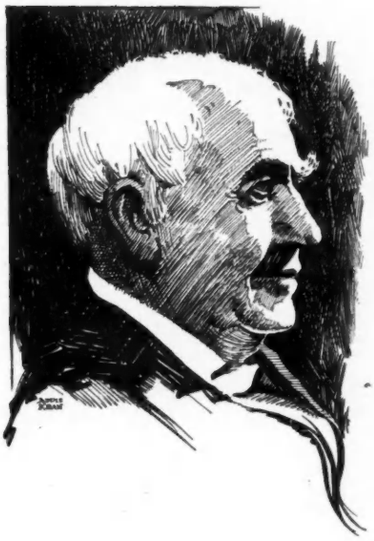
Rapid Disengagement is Necessary

The third requirement—rapid disengagement—does not in itself appear very difficult to meet, and probably would offer but little trouble to the engineer working on a definite original equipment installation. In a number of cars equipped with vacuum-operated clutches that have been driven by the writer the installation was open to considerable criticism on this score.

The next two problems, viz., engagement from free wheeling at different speeds and troubles that may be caused by variation in engine friction, go hand in hand. These problems call for some real thought and ingenuity. Entirely different clutch-engagement characteristics seem to be required when an engine is started on a cold morning than after it is thoroughly warmed up. The same is true considering the difference between a new and stiff engine and one that has been well run in. The difference is in the rapidity with which the engine accelerates following the opening of the throttle and the simultaneous setting in

(Turn to page 670, please)

Thomas Edison, Pioneer of Electric Vehicle Development, Dies in Sleep



WITH the passing of Thomas Alva Edison at West Orange, N. J., on Sunday last, at the age of 84, the world lost one of the greatest inventive geniuses of all time. The public had been prepared for the news through physicians' bulletins a considerable time in advance, and it was characteristic of the great vitality of the inventor that although some of his organs were apparently completely worn out, thus giving ground for the doctor's prediction that the end was near, his heart refused to quit and sustained him for about a week longer.

Mr. Edison was born at Milan, Ohio, February 11, 1847, but his parents moved from there to Port Huron, Mich., when he was only 7 years old. His first employment was as a newsboy on a railroad train, and his liking for research led him to perform experiments even on the train. At 15 he became a railway telegraph operator, and it was in the telegraphic field that he achieved his first success as an inventor. In 1869 he removed to New York City and while there invented an improved printing telegraph for stock quotations which netted him the tidy sum of $40,000.

He then established a laboratory at Newark, N. J., which he later moved to Menlo Park, a little way station on the main line of the Pennsylvania Railroad. Here he performed the celebrated experiments leading to the development of the electric incandescent lamp. Announcements of new inventions, most of them in the electrical line and many of them—like the phonograph—of such a nature as to fire the popular imagination, came from his laboratory at such frequent intervals that he became known as the Wizard of Menlo Park. Among his most notable inventions are the multiplex telegraph (by means of which a number of messages can be sent simultaneously over the same wire), the phonograph and the moving picture machine. His United States patents number more than one thousand.

The Edison Laboratory at Menlo Park became famous throughout the world, and to have worked in it was for a long time a distinction of no mean value in the electrical industry. As a matter of fact, a considerable number of men who later achieved great distinction in the electrical world received their early training there. Last year the fiftieth anniversary of the invention of the incandescent lamp was celebrated at Menlo Park with fitting ceremonies.

At the time when popular interest in motor vehicles was first aroused, and there was a good deal of speculation as to the motive power which would prove the most practical, Edison devoted some efforts to the development of the storage-battery vehicle. It was obvious from the beginning that the battery was the weak link in the chain of parts that made up the electric car, and he set himself the task of finding a new combination of electrodes and electrolyte which would be free from the excessive weight and the mechanical frailties of the lead-sulphuric acid combination.

A wide search of possible couples was evidently made, and early in 1901 considerable publicity was given to a British patent issued to Edison on a storage battery having electrodes of copper and cadmium. This cell, however, has an electromotive force of only 0.44 volt and a battery of more than 200 cells would have been required to supply the vehicle motors of that period, which were designed to be charged efficiently from 110 volt direct current circuits.

The copper-cadmium couple seems to have been abandoned almost immediately, for only a few months later a paper was presented to the American Institute of Electrical Engineers by Arthur E. Kennelly in which the author described the Edison nickel-iron alkaline storage battery, which later became a competitor of the lead storage battery in certain fields. It had an e.m.f. of about 1.2 volts per cell, as compared with 2 volts for the lead battery. The Edison Storage Battery Company was organized in May, 1901, and incorporated under the laws of New Jersey with a capital stock of $1,000,000 to manufacture this battery. Being more expensive to manufacture than the lead battery, it never succeeded in ousting the latter from its field, even though it possessed advantages of lower weight and longer life. In recent years its chief field of application has been as a source of power in electric industrial vehicles.

A considerable number of different firms were organized to commercially exploit certain inventions of

(Turn to page 670, please)

The Citroen-Kegresse track or running band used on the Haardt Expedition cars is made up of metal plates protecting the transmission belt. Contact with the soil is through a succession of heavy rubber blocks + + + +

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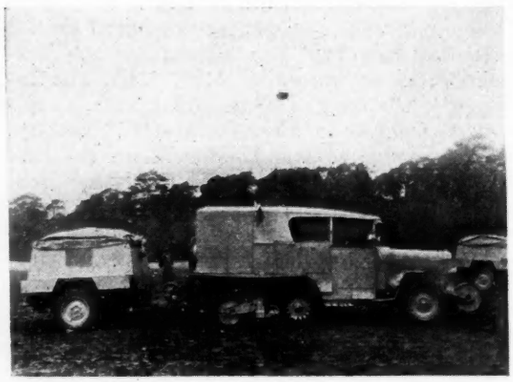
Citroen Builds Special Cars of the for the Trans-Asiatic Expedition

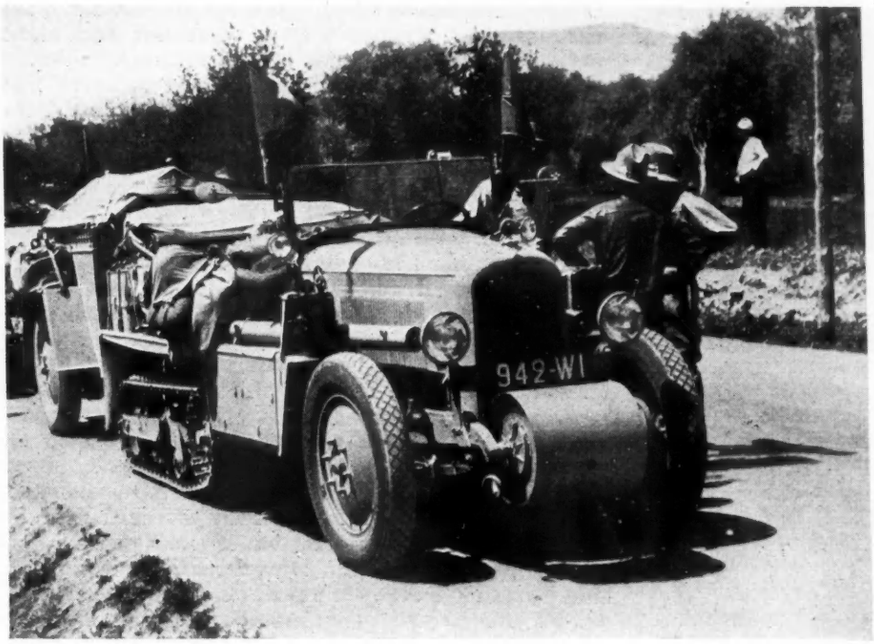


CONSIDERABLE interest has been aroused in a trans-Asiatic expedition by motor vehicles organized by Georges-Marie Haardt, a French explorer, with the assistance of Andre Citroen, the French automobile manufacturer, and the cooperation of the American Geographical Society. M. Haardt made two previous exploration trips, both through the interior of Africa, and in the selection of the equipment for this new enterprise he was guided by his previous experience.

Contrary to statements which have been made, this is not the first crossing of the Asiatic continent by motor car, for in the New York-to-Paris race in 1908 George Schuster in an American Thomas car and Captain Koeppen in a German Protos crossed Asia from Vladivostok to the border of European Russia, and a trip from Italy to Peking, China, was made in an Italian car a great many years ago.

M. Haardt's original plan was to start from Beirut in Syria, cross Mesopotamia and Persia, penetrate into Russian Turkestan southwest of the Caspian Sea, and proceed

Two views of the China type car, the upper one showing the body completely closed, the lower one with trailer ready for the road + + + + + + +



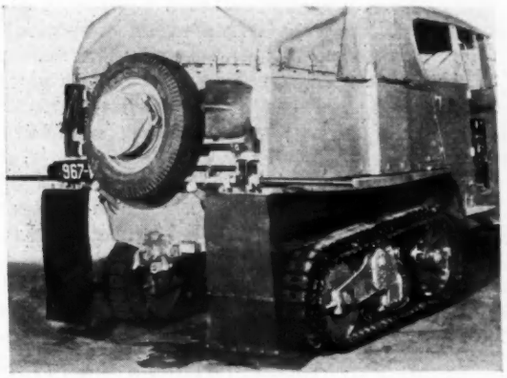
Leader's car and fleet just outside of Damascus, the oldest city in the world

Below—An improvised road on the Svinegar-Gilgit trail gave way but the car was saved by the use of block and tackle

Tracklayer Type of G.-M. Haardt

thence to the Russian-Chinese frontier of Turkestan, staying north of the Boukarie mountains and the rugged Pamir region. However, owing to refusal of the U.S.S.R. to issue a permit to cross Soviet territory, Turkestan had to be left out of the itinerary. Under the new plan a first section of the expedition, under M. Haardt's leadership, left Beirut for Kashgar in the Sin-Kiang by way of Syria, Persia, Afghanistan and the 16,000-ft. passes of the Pamir mountains which are said never before to have been traversed by any type of vehicle. A special type of tracklaying tractor was built for surmounting these passes. The second section, under Lieutenant-Commander Point, has taken eight tracklayer tractors, of a somewhat different type with their trailers, by sea to Peking (Peiping), whence they will make their way to Kashgar. After the two sections have met they will proceed together to Peking under the leadership of Mr. Haardt, using the tractors which have been waiting at Kashgar, while the mountain equipment will be returned to the Syrian coast.

Three types of vehicles are used for the expedition, viz., cars of the tracklayer type suitable for all kinds of territory, known as the China type; cars of the tracklayer type suitable for use in the mountains, referred to as the Pamir



At the right is shown the rear section of one of the tracklayer cars + +

type, and special trucks adapted for traveling on soft soil, which will be used for replenishing supplies.

All cars used for the expedition were built in the Citroen factory. As far as possible, standard parts of stock vehicles were used in their construction, and the only chassis parts specially designed for the purpose were a governor for the engines which limits the speed to 3300 r.p.m., and a supplementary reduction gear incorporated directly in the driving wheel, which makes it possible to use standard differentials and driving gears and yet secure the increased driving effort and reduced speeds called for by the topographical conditions. Although the driving gear incorporated in the wheels was an extra mechanism that meant additional expense, it was considered that the over-all cost would be reduced by its use, since it made possible the use of stock parts for the remaining transmission mechanism. The use of stock parts, moreover, assured added reliability and the possibility of replacing worn or broken parts without fitting, because of their complete interchangeability.

Pressed steel side seats are furnished for native guides

While the vehicles are described as of the tracklayer type, the tracks are quite different from those used on corresponding farm tractors and on military tanks. The Citroen-Kegresse track or running band is made up of a sort of armor of metal plates protecting the transmission belt. Slippage of the belt on the driving wheels is prevented by cleats on the inner face of the belt, equally spaced along its length, which engage into grooves or slots on the circumference of the driving wheel. Contact with the soil is through a succession of heavy rubber blocks.

The tracklayer cars of the expedition are of three distinct types. The first of these, known as the "all-purpose" or China type, will be used for the greater part of the journey. The second, referred to as the mountain or Pamir type, is designed for crossing the high passes of the Pamir region, while the third, the radio car, is not intended to be driven over long distances.

The "all-purpose" fleet comprises one special scout car designed for use without a trailer and eight cars, all of the same type, each drawing a trailer.

Each of the eight cars is designed to carry five passengers, including the driver, while the two-wheeled trailer carries their camping and sleeping equipment, part of their baggage, a few spare parts, and a large tent. Each trailer carries a spare wheel and a storage battery for lighting the tent, and it is equipped with an electric rear signal light. The trailer body is made of duralumin. Each trailer with its complete load weighs about 2500 lb.

The tractors, which weigh about 3000 lb. each, also have riveted duralumin body panels, with a detachable canvas roof. At the rear there is a platform on which are carried supplies for daily consumption, such as gasoline, canned goods, provisions purchased en route, etc. These platforms will serve also to accommodate any natives which may have to be taken along in addition to the guides and boys who are provided for elsewhere. The body of the tractor is normally completely closed, but it can also be fully opened by rolling up the canvas roof, removing the side curtains and opening up the two-part windshield. An electric dome light makes it possible to work and read in the cab at night.

Directly back of the cab there is a compartment for storing the two suitcases allowed each member of the expedition and for most of the other equipment that is found necessary on an expedition of this kind. Thus there are in this storage space two large tanks for drinking water, one on each side, and compartments for the various instruments and accessories carried, such as cameras, films, ammunition, scientific instruments, surgical supplies, painting and drawing equipment, etc. Firearms are hung on a rack in the cab, while in a spacious compartment under the floor of the latter are stored spare parts and tools that may be needed en route. The most frequently used tools, however, are stored in a special compartment directly in front of the driver.

Each tractor is equipped with a 50-hp. six-cylinder engine. Fuel is fed to the carburetor by a mechanical pump from a 60-gal. tank which is located between and protected by the deep side rails of the chassis frame. The contents of an emergency tank of about 20-gal. capacity can be made instantly available by means of a cock located convenient to the driver. In order to prevent waste of fuel in filling the tanks, and also to reduce fire risks, a battery of electric pumps and a hand pump are provided for filling the tanks of the vehicle.

Dual ignition is provided by a magneto and a battery system, and the driver can use either at will. Two batteries are carried on each tractor to supply current to the various ignition and lighting circuits. In addition to the two regular headlamps, each tractor is equipped with two portable searchlights which can be carried to some distance from the vehicle.

Air is taken into the carburetor through a fine-mesh screen, to prevent sand and abrasive dust getting into the engine. The radiator is of unusually large capacity, considering the size of the engine, and in tropical climates the capacity of the cooling system can be further increased by replacing the metal hood of the engine by a hood made of artificial leather, the sides of which can be rolled up.

Engine power is transmitted by means of a clutch and three-speed transmission to the driving axle, which is concentric with the forward wheels of the tracklayer units. The rear wheels are idler wheels

but serve to carry some of the weight of the tractor.

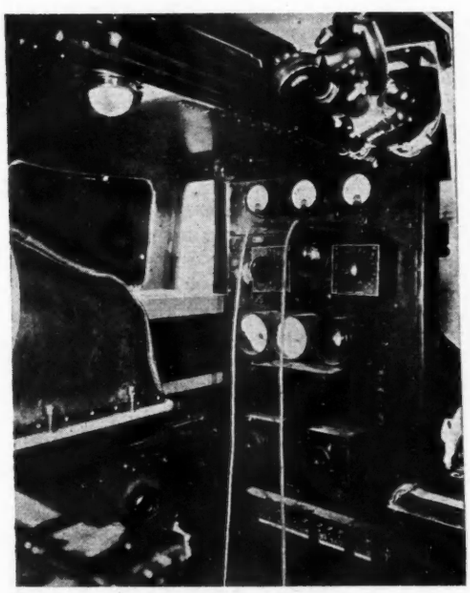
Each tractor is equipped with three brakes. Two of these are servo brakes and act on both the forward wheels and on the driving wheels, while the remaining one acts on the propeller shaft and therefore through the tracks only.

The Kegresse propelling device comprises, in addition to the driving wheel and the idler pulley, two small idler wheels which support that part of the weight of the tractor (about four-fifths) which is not carried by the front wheels. These small idler wheels are supported on a beam fastened to the frame, and roll on the inside of the tread. They are fastened by means of a balancing arm to the idler pulley, so that the latter also is made to support some of the weight. In front of the radiator there is a large, freely-turning steel cylinder, which serves as an aid in negotiating steep banks. It raises the entire forward part of the car, which otherwise would be driven into the bank by the propulsive effort.

The combination consisting of tractor and trailer weighs in the neighborhood of six tons, yet is capable of propelling itself on grades up to 30 per cent, and of stopping anywhere on either the up or the down grade. Riding qualities are said to be considerably better than those of the ordinary motor truck of equal capacity, the front wheels being fitted with balloon tires and the driving tracks with rubber blocks. Removable metal seats are mounted on the outside of the body for carrying native guides, boys and helpers that are taken along temporarily in the different countries. These seats are periodically disinfected by fire.

A doctor accompanies the expedition and one of the cars is fitted up as a medical car. Complete medical equipment is being taken along and also the necessary equipment for performing operations if necessary. The medical car is so arranged that the rear seat can be transformed into a bed if any member of the expedition should become ill.

The eight "all-purpose" or China-type cars serve as leader's car, staff car, medical car, workshop car, radio car, kitchen car and two "movie" cars. The workshop car is a regular traveling machine shop and carries the chief mechanic of the expedition. The "movie" cars carry complete photographic apparatus, cameras to be used with plates and films for black and color photography, cameras for silent moving pictures and a complete outfit for sound moving pictures.



The radio car has a 500-mile range

The scout car, which was found to be a necessary complement of an exploring outfit during the African trips, is of the same general construction as the other "all-purpose" tractors but does not draw a trailer behind it and is therefore more speedy. It also differs from the others in being provided with a touring car body capable of carrying seven persons. A large trunk in the rear carries the equipment necessary for camping, and a small radio-sending outfit with a radius of 500 miles is carried.

The Pamir-type cars, designed for crossing mountain passes 16,000 ft. high, have many special features. In their design it was aimed to obtain the least weight per unit of ground-contact surface, maximum engine power per unit of weight carried, maximum transmission efficiency and maximum towing ability.

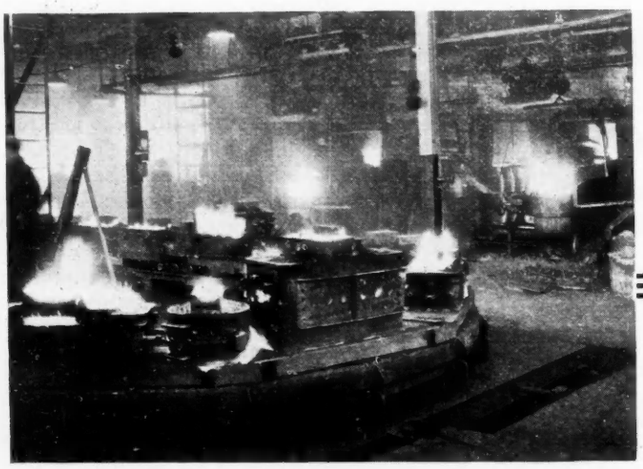
In order to make it possible for the cars to travel over snow, the weight carried was reduced as much as possible and the running bands were provided with wider treads. To reduce the weight of the car the width of the chassis frame was reduced from 55½ to 52 in., a much simplified touring body for four passengers was fitted, and the amount of baggage carried was reduced. The narrower chassis is evidently an advantage in narrow passes.

To increase their specific power, these cars were fitted with a four-cylinder instead of the six-cylinder engine. The absolute power delivered by the four-cylinder engine is less than that of the six-cylinder, but the weight saved by the use of the smaller engine and by the lower fuel consumption made it advantageous to use the four-cylinder. To compensate for the loss of power at high altitudes, which amounts to approximately 50 per cent at an altitude of 16,000 ft., the engine is fitted with a supercharger. Precautions were taken also against extreme cold, the engine hood being lined with felt in that case. These Pamir cars, moreover, are provided with a supplementary two-speed gearbox which gives the operator a choice of six forward gear ratios. In spite of the reduced power, these Pamir cars have much greater hill-climbing ability than the China type.

A reconnoitering group is sent ahead to make a study of the route to be traveled and establish stores of fuel and provisions.

It is estimated that the convoy of China cars will make an average speed of between 10 and 15 m.p.h., on ground which is neither too soft nor too rocky, so that from 100 to 150 miles can be covered per day of 10 running hours. It is expected, however, that this daily average will be materially reduced in the case of sandy stretches, such as the Gobi desert, and marshes, such as those in Dzoungaria. The speed will be further reduced when natural obstacles, such as rivers, are encountered.

The Pamir cars will develop a considerably lower average speed, especially during the more difficult parts of the trip. During the first part of the journey, as far as Herat, or perhaps Fuizabad in Afghanistan, a speed of 10 m.p.h. is figured on, except over the sandy soil close to the Euphrates in Mesopotamia, where the speed may be reduced to 7 m.p.h.



Many materials handling problems in the foundry have been solved by the C. O. Bartlett & Snow Co. equipment

PRODUCTION LINES

Safety First

Tribute is paid to one of our pioneer truck makers in "Labor and Industry," June, 1931 (Commonwealth of Pa.), for their safety work. Here's what the state labor dept. says in part:

"The Autocar Company, of Ardmore, climaxed a highly creditable three-months' safety record this year with a perfect score for the March no-accident month. Noteworthy in the Autocar Company record is the achievement of its punch press department, with an average of 25 employees, which has gone three years and three months, or approximately 150,000 hours, without a lost-time accident."

Certainly an enviable record for any press shop.

Turning Losses Into Profits

Circular No. 3105 is one of an interesting profit series by Warner & Swasey. It tells how a modern turret lathe can be tooled to save money even for a jobbing shop. 30 different jobs in small lots were processed with an average time-saving of 30.5 per cent. Have you seen the new W & S equipment replacement statement? It's well worth studying if you are interested in cutting costs.

Hydraulic Facts

Those interested in the design and utilization of hydraulic mechanisms will want a copy of a new handbook just issued by the Southwark Foundry and Machine Co., Philadelphia. Some of the material is decidedly new and is said to be published for the first time. For example there is a section giving tabular values for Q, the quantity of water in GPM passed through 100 ft. of clean steel pipe under various pressure differentials, and the additional pressure necessary to deliver the quantity Q. A pipe table and new data on accumulators, pumps, and shock valves are also of great interest. A limited supply is available for free distribution. Ask for bulletin No. 25.

Something New

According to Dr. Herty, at the Metals Congress in Boston, the latest thing is an electrolytic etching technique. It works beautifully in hunting for blowholes, inclusions, seams, etc. It spots blow holes so you can't mistake them for anything else.

Herty Recommended—

that metallurgists set up standards for inclusion identification. He also suggested that tests should be made at 100x magnification in inspection. Because smaller inclusions are probably of little consequence.

Again—

at the sheet steel sessions, the same idea cropped up. Take deep-drawing stock. Rockwell and / or Erichson specifications alone seem to be inadequate. The final test is behavior on the press. Tell the mill what your problem is. For instance, are you troubled with stretcher strains? Cold work immediately before drawing is found very effective. Due to rapid aging, however, roller leveling should be done by the user rather than the mill.

Drawing Compounds

Deep drawing requires a proper drawing compound for good results. Particularly to conserve die life. Chief factors to be considered in selecting a compound are: the hardness of the die; character of the work, and character of the compound. According to discussion at the sheet metal session, the subject still needs a lot of study. Here's a job for some real lubrication expert.

Try Dressing

A rubber belt dressing, "Goodrich Plastikon," is now marketed by The B. F. Goodrich Rubber Co. It's a hard substance containing no oil or grease and is made in stick form for application on a moving belt. The compound is said to contain no chemical harmful to belt or pulley.

Plus-Strength

Frank Curtis tells us that K&T Fullback milling cutters are designed with greater thickness at the hole to offer adequate strength for successful tungsten carbide milling. The diameter of locating plugs is the same but the length is increased. Remember this when ordering supplies.

Analyze With X-rays

We heard with great interest that General Electric has placed in operation what is said to be the largest X-ray laboratory in industry. A 200,000 volt X-ray tube is used. One of the latest wrinkles is to utilize special stereoscopic viewing equipment. Two photos taken from slightly different positions give an impression of depth.—J. G.

MANUFACTURING MANAGEMENT METALLURGY

Foundry Production Boosted Nearly 400 Per Cent by Mechanical Handling

Photo by John P. Mudd, The Midvale Co.

Since 1925 attention of steel foundries has been centered on the production of alloy steel

THE general trend in foundries producing castings in any quantities is toward greater technical control of all processes and to greater mechanical handling of the bulky materials which constitute the major portion of foundry work. This trend promotes more accurate and sounder castings. Materials handling, consisting as it does of large tonnages of pig and scrap iron, coke, melted metal, sand, molds, and castings, is being given very close attention by foundry engineers. An interesting example of such attention is reported by one large automotive foundry whereby, with conveyor and molding machine equipment, production per man was increased from 150 lb. of good castings in 1916 to 585 lb. per man in 1930.

Greater attention is being given to cooperation between the designing engineer and the foundry to design castings which take into consideration the metallurgical factors necessary to produce sound castings and which permit ease of production through using molding machines.

Methods of testing foundry sands have been developed through a research committee of the American Foundrymen's Association. As a result, sand control has made rapid strides, and with it there has been an advancement in the use of synthetic sands, whereby silica sand and bonding material are mixed to provide a uniform high quality medium. With sand control there has come into greater use mechanical sand handling and conditioning plans operated in connection with batteries of molding machines, flask and mold handling units and continuous pouring of castings.

In the malleable cast iron field the big development has been the production of high strength iron with four foundries reporting average physical values of 57,600 lb. per sq. in. tensile strength, yield point of 37,900 lb. per sq. in. and elongation of 23 per cent in 2 in. Short cycle annealing and special heat treatment of white iron castings to produce castings of even higher strength has been given successful attention. These castings, while not strictly of the black heart malleable type, are closely allied because of the same general production methods being followed in their production.

Developments in Gray Iron Castings *

In the non-ferrous field, new alloys producing almost any desired combination of physical properties are being developed. Heat treatment of these and the old alloys have been developed to give more reliable and better properties. Close attention to control of melting

*Contributed by H. Bornstein, Chief Chemist, Deere & Co., Moline, Ill.

conditions and pouring temperatures is also producing good results.

The term "gray iron" covers a wide range of material just as does the term "steel." One of the developments in cast iron today is the realization by the engineer and the user of castings that there are various grades of "cast iron" which cover wide ranges of physical properties. The foundryman is taking greater care with his mixtures and with melting conditions in order to supply the types of cast iron desired.

Alloy cast irons have a wide commercial use. Nickel, chromium, molybdenum and combinations of these are being used in order to secure desired results in machinability, hardness, strength, wear resistance, etc. The high strength irons are being developed and used. Tensile strengths of 50,000 lb. per sq. in. were unheard of for cast iron a few years ago but such irons can now be readily supplied. These higher strengths are obtained through use of materials and melting conditions which result in lower carbon iron and occasionally through the use of alloys.

While the cupola is still the melting unit largely used for cast iron, the electric furnace has been getting into the picture rapidly during the past few years. Duplex methods (melting in the cupola and refining in the electric furnace) have been developed in the production of high quality iron. The Bracklesburg furnace, a German development using pulverized coal as fuel, shows promise in the production of quality cast iron.

One of the newer developments commercially is heat-treated cast iron. Formerly heat treatment consisted largely in annealing to remove internal stresses and to soften the iron, rendering it more machinable. Now cast irons are being quenched and drawn in order to secure additional hardness to resist wear. In some cases considerable strength is secured by such a treatment.

Progress is also being made in the testing of cast iron. The best test, of course, is on the casting itself under service conditions. A correlation may be worked out between the casting and a test bar. We are getting away from the idea that the test bar should represent the metal in the ladle. The engineer is interested in the metal in the casting. In some cases hardness tests are made on the casting itself. In other cases a test bar is chosen to represent the cooling rate of the casting.

Cast iron has made and is making rapid strides. It is the opinion of many in the industry that it has made phenomenal progress in the past 10 years. This progress has resulted in its being considered more and more a dependable engineering material.

Steel Castings*

The steel casting industry, to an extent that has been particularly noticed by many others, has made much technical progress during the last 15 years. Since 1925, steel founders have centered attention in steadily increasing numbers on the production of the alloy steel product. Whereas 10 years ago, relatively few founders made serious efforts to make high-grade castings of varied, special grades of steel, there are now many steel casting concerns offering alloy steel castings to consumers.

Experience is an indispensable teacher, particularly in this special field of casting production. The slowness with which satisfactory technique in the foundry for this purpose may be developed is accompanied by the inability to quickly assemble definite, reliable information regarding the characteristic behavior of each of many grades of alloy steels, put skillfully into castings. Although the American Society for Testing Materials has been endeavoring for several years to formulate specifications for alloy steel castings, it has not yet been able to accomplish this, except for austenitic manganese steel.

The 300 (more or less) plants that make up the American steel casting industry include some that have been acquiring experience of considerable expense to themselves and to their customers in alloy steel production. In that field, considered collectively, the industry has been, until recently, a novice, but it is now very much in earnest in efforts to qualify itself.

Much has been learned as the result of diligent research and extended inquiry made by those steel founders who have been sufficiently progressive to become "quality-conscious" and "alloy-minded" in advance of others in this industry. Informative data have been accumulated regarding the behavior of steel castings under conditions involving extraordinary static loads, severe shocks, corrosion, abrasion, erosion and high and low temperature. As a result of the distribution of such information, many metallurgists who have not specially studied steel castings previously, have been surprised at their impressive performance.

The present product of the steel foundry is enormously adaptable. Depending on chemical composition and heat treatment, tensile strength values regularly run from 50,000 to 200,000 lb., while ductility values range from moderate to extraordinary, going up to 65 per cent in reduction of area, physical properties being regulated almost as much by discriminating heat treatments as by selective chemical compositions.

It is appropriate to mention in this connection the superior results obtained from the casting as compared with the forging (compositions being fairly equivalent), for resisting certain destructive agencies; evidently due to the relatively large granular structure, typical of the casting.

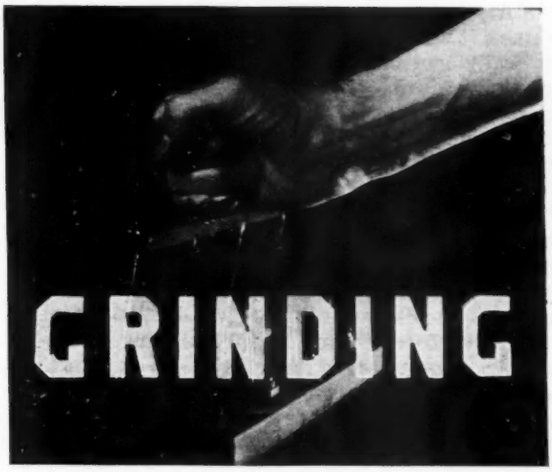
As a result of the present business depression, the steel casting industry will undoubtedly profit, eventually. During the next five years, there will be developed many uses for steel castings where these are not now employed, and where this product may be utilized with appreciable savings in ultimate costs, as compared with any other material. In such developments, the automotive industries should be well represented.

*Contributed by R. A. Bull, Director, Electric Steel Founders' Research Group.

A CONSIDERABLE amount of aluminum went into the construction of the Blue Bird, Captain Campbell's speed-record holder. The pistons of the Napier engine are forged of Y alloy (4.0 Cu., 2.0 Ni., 1.5 Mg.). The crankcase was cast of 2L5 alloy (2.75 Cu., 13.5 Zn.), which is the standard British alloy for structural parts. The carburetor body and camshaft covers are of RR50 alloy; the impeller forging of the engine is of RR56 alloy, and the rear cover is of a light alloy which is not particularly specified. On the chassis, the rear axle center housing, the brake shoes, the steering column and the wheel disks are of light alloys, while the body has about 600 sq. ft. of sheet aluminum paneling.

Increased Production and Reduced Cost of Grinding Achieved During Year

by Joseph Geschelin



This article supplements those printed in the Production and Factory Equipment Issue

DEVELOPMENTS in the field of precision grinding may be charted along the following lines for quick reading:

1. Increasing number of semi-automatic machines, many of them being single-purpose.
2. Further extension of multiple wheel machines.
3. Almost universal adoption of hydraulic power.
4. Better finish achieved by rugged construction and elimination of vibration.
5. Use of automatic hopper feed.
6. Improvements in grinding wheels.
7. Introduction of large capacity internal grinding machines.

Finish is an increasingly important factor in the automotive industry. The first grinding machines came into being chiefly because they were able to produce a better finish within closer limits of accuracy than any other known method. During the years of development grinders have been used more and more as a means for rapid stock removal but with this have come improvements in the degree of finish. Especial strides have been made in this direction within recent months. Machines have been made heavier and strengthened throughout. Designs have been carefully worked out so as to practically eliminate vibration which might be transmitted to the surface of the work being ground.

Perhaps one of the outstanding contributions to grinding practice was R. E. W. Harrison's paper, "A Survey of Surface Quality Standards and Tolerance Costs Based on 1929-1930 Precision Grinding Practice," which was reviewed in *Automotive Industries*, Dec. 13, 1930. Based on painstaking research, the author submits a code for standardizing quality of surface finish. The paper gives in detail a suggested set of standards and describes test equipment by means of which surface quality may be measured.

In the field of semi-automatic single purpose grinders, many highly productive machines have been furnished for a great variety of parts. For example, one maker has built a semi-automatic side gear grinder on which both the hub and the face of differential side gears are ground simultaneously. The operator simply loads and unloads the work and operates two controls, the work in this instance, contrary to the usual practice, feeding toward the wheel instead of the wheel toward the work. The same manufacturer has a semi-automatic gem grinder which is so human-like in operation that the operator needs but load and unload the work and manipulate two convenient controls; all cams on the shaft (including the fuel pump cam, if one is used) are completely and automatically ground to size. While all of this is taking place on one machine, the operator may load and unload two or three additional machines, thereby tripling or quadrupling his production.

One of the outstanding multiple wheel applications has been in connection with grinding simultaneously the three main camshaft bearings of a well-known four-cylinder camshaft. Three 36-inch diameter grinding wheels are carried between the wheel spindle bearings instead of on the end of the spindle, as is usually the case. The same type of machine, equipped with crank heads, is used to simultaneously grind either the two inside pins or the two outside pins of four-cylinder crankshafts. A plain machine equipped with three wheels has been used to grind three diameters on small motor armatures. Yet another three wheel application is used in connection with the grinding of stub shafts.

Centerless grinding needs no introduction. But the past year has seen remarkable advances in productivity and cost reduction largely due to the continuous production idea involving the use of hoppers. One typical set-up uses hoppers which automatically feed work to the grinding machines, conveyors which carry the work from the outfeed end of one Centerless Grinder to the next hopper; and automatic sizing devices which eliminate the necessity of hand sized control to the work.

Today, some piston pins are passed through a Centerless Grinder six or more times to obtain the accuracy desired. As the pins come to the first machine for the roughing pass, they vary in size up to 0.005 in. During this first pass approximately 0.008 in. of stock is removed. The second pass decreases the size 0.007 in.

The third removes 0.003 in.; the fourth 0.002 in.; the fifth 0.0015 in. and the sixth 0.0005 in. Limits are held to plus 0.0000 in. and minus 0.0003 in.

With the introduction of hoppers, facilities are provided for the operation of a battery of three or four Centerless Grinders by one man. Supervision of the activity of a battery of grinders is facilitated by arranging the machines so that work from the roughing grinder flows directly to the hopper of the semi-finishing machine, and so on.

To make it possible for one man to operate three or four machines, it was necessary to develop some method of automatically controlling the size of the work. Accordingly, sizing devices were developed which automatically keep the work to a given size as it passes through the grinder. Automatic sizing eliminates the necessity of frequently checking parts for size or manually adjusting the feed wheel slide. What was formerly the task of the operator is now the job of the machine. Automatic sizing is applicable on the roughing and semi-finishing grinding operations and it is on these preparatory passes that its real merit is evidenced. By holding the limits close in the initial passes, a uniform stock removal on the finishing operation is obtained, thus assuring closer limits of accuracy.

To many production men, one of the most important developments was the recent introduction of several prominent makes of massive, heavy duty internal grinders; one has a capacity of 24 in. bore. These machines offer a dependable, economical, production method for aircraft engine cylinders, sleeve valves, wheel hubs, pump cylinders, and the like. In this field, notable advances have been made in automatic gaging and sizing, yielding greater accuracy at reduced cost.

The influence of grinding wheel improvements cannot be overstated. Factors of surface quality, productivity, and overall economy are intimately related to wheel performance. Recently a prominent wheel manufacturer advanced a new principle—that of "controlled wheel structure." The idea is to control not only the abrasive grain and the bonding material but also the arrangement of these. Great strides have been made by other manufacturers to improve precision grinding in other directions.

Much of the simplicity of modern grinding machines may be attributed to the increasing use of hydraulic mechanism. Ease of handling, elimination of fatigue, and application of automatic sizing devices, all contribute to the greater productivity and better quality provided by today's production machines. Where quantity demands it, further economies have been achieved through the use of automatic feeding devices, hoppers, and the like.

Tip Relief and Cost Finding Discussed at Semi-Annual Meeting of American Gear Manufacturers Association

(Continued from page 642)

standard for industrial worm gearing a pressure angle of 14½ deg. is specified for single and double-thread worms, and a pressure angle of 20 deg. for triple and quadruple-thread worms. The suggestion referred to is that the 14½-deg. pressure angle be confined to single-thread worms, and that a 20-deg. angle be used for those with double threads. Mr. Himes remarked that the fact that a 14½-deg. pressure angle had once been adopted as standard was no reason it should be continued indefinitely, and he proposed to get a definite expression of opinion from every member company as to whether or not the 20-deg. pressure angle was preferable for double-thread worms. It was pointed to as an objection to a change in worm-gear standards that it might render a large investment in hobs more or less worthless, to which the rejoinder was made that in any case any change made would be in the form of a standard for future design only.

Ira Short, chairman of the Herringbone Gear Committee, said that the committee at this time was working on a load-capacity formula, with the assistance of Professor Mickle of the University of Michigan who represents the A.S.A. Sectional Committee on Gearing. There probably would be two formuli, one based on the beam strength of the gear teeth, and the other on the resistance of the material to compression on the tooth contact surfaces.

B. F. Waterman, as chairman of the A.S.A. Sectional Committee on Gearing, reported that three standards or recommended practices of the A.G.M.A. were now up for consideration as American standards, these being the 20-deg., full-depth, involute-tooth form, the system of nomenclature adopted by the association, and the recommended practice for gear inspection.

It was brought out in the report of the A.G.M.A. Gear Research Committee that within the past few weeks a book had been published which contains a summary of the gear research work done at Massachusetts Institute of Technology on the Lewis gear-testing machine, and copies of this book had been sent to all those who had contributed toward the expenses of this research.

On Friday afternoon some of the members visited the plants of the Pittsburgh Gear & Machine Co. and the Nuttall Works of the Westinghouse Electric & Manufacturing Co. At the latter plant they had the opportunity of inspecting some exceptionally large gears which are being made for the electric locomotives of the Pennsylvania Railroad. These gears have ground teeth of more than normal depth, with fillets at the bottom of such large radius that the bottom of the tooth space is semi-circular. The reason for the abnormal tooth depth is that it gives smoother action, while the large fillet radius—the largest possible—adds to the beam strength of the teeth.

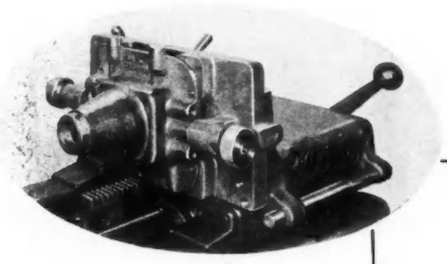


Fig. 1. The transmission gearshift housing is of malleable iron + + + + + +

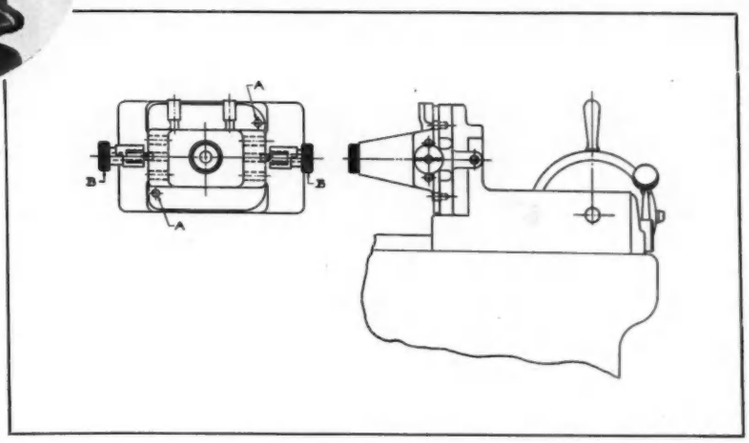


Fig. 2. The semi-finished part is centered on a special fixture by means of locating pins A and B + + + +

Landis Threading Machine Solves Production Problems

THE threading of certain automotive parts has long been a difficult problem. Thread inaccuracies, eccentricity, unsatisfactory finish, limited relief at the end of the thread, odd shapes and tough materials have each contributed their share to the worries of the automotive engineer.

The Landis Machine Co., Inc., at Waynesboro, Pa., have submitted two examples of automotive parts which are being threaded in a very satisfactory manner with the new 1½-in. single-head Landis Landmaco threading machine tooled with Landis ground thread chasers. A leadscrew is employed in each case to insure accuracy in lead and a full formed thread at the start.

The transmission gearshift housing, shown in Fig. 1, is a malleable iron casting. It comes to the threading machine faced, drilled, reamed, bored, turned and recessed.

The semi-finished part is centered on the special fixture by means of the locating pins *A* and held in position by the two spring-acting latches *B* (Fig. 2). The knobs are offset to keep the latches open for loading and unloading. The latches are released by a slight turn of the knobs, according to the makers.

The thread, a 2 1/16-in., 16-pitch—Nat. Spec. thread—9/16 in. in length with a 3/32 in. relief, is cut to a class 3 fit at 40 ft. per minute. The production is 100 to 110 threads per hour.

The axle shaft comes to the threading machine finished, except for the two threading operations.

For the 1⅜-in., 16-pitch—Nat. Spec. thread—13/16 in. in length, the axle shaft is centered in the special round grips *A* Fig. (3). The shoulder *B* serves to locate the part horizontally for thread length. The shaft is also supported at the spline end by the adjustable bushing *C*, driven by the bracket *D* through the sleeve *E*. A separate bushing is required for each spline size, the specifications show.

A set of special tapered grips, not shown, are employed in centering the shaft for the outer thread, a ⅝ in., 18-pitch Nat. Fine thread, ¾ in. in length with no relief. An adjustable stop is employed to locate the axle for this thread.

The shaft is an alloy steel forging which is heat treated prior to the grinding and threading operations. Both threads are cut to a class 3 fit at 20 ft. per minute. The productions are 90 per hour for the 1⅜-in. thread and from 150 to 175 per hour for the ⅝-in. thread.

The bed of the Landmaco threading machine is a rigid semi-steel casting. The spindle and leadscrew are mounted on preloaded ball bearings. The die head is made of a high carbon steel, heat treated throughout and ground. Threads cut with this machine when equipped with Landis ground thread chasers are said to meet the requirements of the automotive industry.

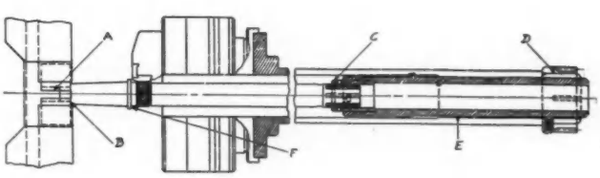


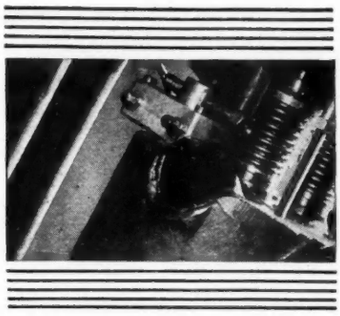
Fig. 3. The axle comes to the threading machine finished except for two threading operations +

Automotive Oddities—By Pete Keenan

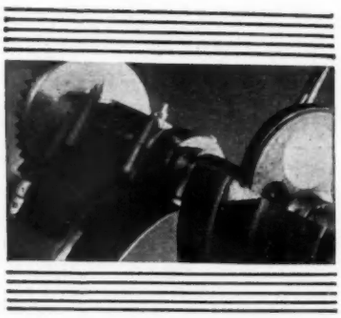
THE INTERNATIONAL HARVESTER COMPANY. USED FREE WHEELING 25 YEARS AGO.
Submitted by H.D. McDonald.
Pete Keenan
LANGLEY'S STEAM DRIVEN MODEL AIRPLANE FLEW IN 1896.
AN INTOXICATED DRIVER ARRESTED IN AMBRIDGE, Pa. BOUGHT HIS CAR IN CUMBERLAND, Md. HE CARRIED A NEW YORK DRIVERS LICENSE, AND USED PENNSYLVANIA LICENSE PLATES.
GRANDMA HANNA HAWKINS 84 YEARS OLD HITCH-HIKED HER WAY THROUGH THREE STATES
Jeffers, Minn. 1931

Do You Know An "Oddity"?

Correspondence about "Automotive Oddities" is invited. Contributions used will receive editorial mention when practicable. If you are interested in the source of, or the reason for, a particular "Oddity," ask the editorial department of Automotive Industries about it.



NEWS OF THE INDUSTRY



General Motors Earns 25c Per Share in Quarter

Earnings for 9 Months Reach $2.08 Per Share

NEW YORK, Oct. 22—Total net earnings of the General Motors Corp., for the first nine months of the current year reached $97,455,390, according to a statement made today under the name of Alfred P. Sloan, Jr., president of the corporation. After payment of preferred dividends the net figure would read $90,423,699 with $2.08 per share applicable to dividends on the common stock.

The earnings for nine months compare with a figure of $123,826,052 for the corresponding period of last year, which was reduced to $116,631,317 after the payment of preferred dividends, leaving $2.68 per share applicable to dividends on common stock holdings.

Earnings of the corporation for the third quarter of the current year totaled $13,333,214, or $10,989,062 after the payment of preferred dividends, leaving 25 cents per share applicable to the common stock. This compares with total earnings of $25,470,697 for the corresponding quarter of last year, with 53 cents per share applicable to common stock dividends. The directors of General Motors Corporation will meet next week.

Bohn Reports Loss

DETROIT, Oct. 20—Bohn Aluminum & Brass Corp. has reported net loss of $12,498 for quarter ended Sept. 30, 1931, compared with net profit of $488,261, or $1.38 a share, on 352,418 no par common shares in the preceding quarter and a net profit of $3,970, or one cent a share, in the third quarter 1930.

Net profit for the nine months ended Sept. 30 was $913,060 after charges and taxes, equivalent to $2.59 a share, compared with a net profit of $692,736, or $1.96 a share last year.

STEWART-WARNER CORPORATION has applied for space in the electrical group of buildings at the 1933 World's Fair. The corporation plans a large automotive, radio and home movie products display. * * *

Century Air Lines intends to take the whole family up in the air—half fares for air transportation of children from 3 to 12 years old are now in effect. Babes in arms can ride free. The company states that 11 per cent of its passengers in the past six months have been under 13 years old.

Six gentlemen who were doing business in a big way, selling colored water as a new patent anti-freeze solution, have been sentenced, four to Leavenworth, one to the county jail and another to one hour in custody of a U. S. Marshal.

While his wife was seeking to have him locked up for abusing her, Michael Lazuck was piling on another indignity. In the midst of the hearing, a crash outside took court attendants to the window to see the erring husband climbing out of his wife's car which he had wrecked, trying to steal it from in front of the courthouse.

Westinghouse Electric and Manufacturing Company announces several sites are under consideration and construction will start soon on a number of ferris wheel, slot machine, parking devices. City officials are considering the plan. The first installation is to be a double, twenty-four car vertical parking apparatus on a continuous chain system. The "garage" is to be 32 by 24 ft. on the ground and 105 ft. high. The system is to be a duplicate of the one successfully operated at East Pittsburgh, Pa., for the last year.

Seven hundred and fifty drivers in the west and north divisions of the recent accident prevention campaign celebrated their victory over the other divisions when they were guests, with their wives and families, of the Chicago Motor Coach Company, at a banquet.

If you want to kiss your girl, stop the car or go to the curb, Judge A. J. Hedding of Milwaukee told Norman Wood, when the latter was haled before him for swerving down the main stem of the Wisconsin city.

The author and collector of the above Chicagoiana being our red-haired correspondent, E. McK. J., who goes places and sees things, every day in the week.

THE NEWS TRAILER

Citroen Advocates Car Export Cartel

Presents Plan to Major Industry Group

NEW YORK, Oct. 21—The formation of an international automobile exporting corporation to control the merchandising of automobiles of all makes in those countries which do not have a local automobile industry was advocated today by Andre Citroen, manufacturer in France of the automobile bearing his name, at the Conference of Major Industries, conducted at Columbia University under the auspices of the Institute of American Meat Packers, Columbia University, Chamber of Commerce of the state of New York, and the New York Merchants Association.

This corporation would undertake, with the agreements of the governments of the various countries, to engage, if the government so desires, in the erection of a plant for assembling of cars in that country, when the total registration there shall have reached 100,000, and the annual sales 20,000; to float a large bond issue which would be used for the construction of highways, to be amortized from the profits of the corporation, and to present to the government a certain number of used cars to be taken from the markets in America, France and England. In return for this, the government affected would either remove custom barriers against automobiles entirely or reduce them to a point where they would not be oppressive.

M. Citroen introduced his remarks by showing that during the past seven years the world production of automobiles had attained a value of more than twice all the gold available in the world, and almost one-third the entire wealth of France. The United States, he said, had pointed the way to mass production, but European produc-

(Turn to page 660)

Greetings

Edward G. Budd (left) received Andre Citroen at the door of the general offices of the Edward G. Budd Mfg. Co. when the French automobile manufacturer visited the plant in Philadelphia, Monday, Oct. 19. Later in the day, Mr. Budd and the Philadelphia Chamber of Commerce were hosts at a luncheon in honor of M. Citroen, at which were present the leading business men of Philadelphia

State Highways Employ Many

WASHINGTON, Oct. 22—Employment on state highways in September is estimated to have been 312,000 men. This figure is based on reports made by 33 highway departments to W. C. Markham, executive secretary of the American Association of State Highway Officials. Mr. Markham has just submitted the report to Fred C. Croxton, assistant director of the President's Organization on Unemployment Relief. Estimates for August were 370,000 men employed on state highway. The number employed in September of the present year is greater than that employed in the same month of last year. The decline under August is natural, due to the falling off in contracts which occur after that month.

Produces Educational Film

NEW YORK, Oct. 19—The Bureau of Mines, Department of Commerce, has prepared a one-reel educational motion picture film showing the details of automobile lubrication.

Experiment With Cocoanut Oil

The possibility of a permanent domestic supply of fuel in the Philippines for Diesel engines is indicated by results of laboratory tests just announced by Profs. Crisostomo Ortigas and Luis Gonzaga, assisted by Dr. Amando Clemente, in Manila, in which cocoanut oil gave the same results in a stationary Diesel engine as the same quantity of mineral fuel, at fuel load, according to the National Association of Engine & Boat Manufacturers.

Petroleum Imports Off

NEW YORK, Oct. 21—Imports of petroleum at the principal ports of the United States for the week ended Oct. 17 have been estimated by the American Petroleum Institute at 209,714 bbl. daily. This compares with the daily average of 263,145 bbl. for the week ended Oct. 10, and with 215,250 bbl. daily for the four weeks ended Oct. 17. Crude runs to stills during the week are placed at 2,442,100 bbl. daily. Cracked gasoline produced during the week was placed at 3,438,000 bbl.

Stocks of gasoline at bulk terminals and in transit, east of California, for the week ended Oct. 17, totaled 13,018,000 gal., as compared with 12,988,000 gal. for the previous week, and with 13,218,000 gal. for the week ended Oct. 18, 1930.

Sales Managers to Meet

NEW YORK, Oct. 22—Automobile factory sales executives were to discuss plans for the 1932 national automobile shows at a meeting which was to be held in Detroit Friday, Oct. 23.

Invitations to attend the session were extended to all sales managers of companies belonging to the chamber by R. H. Grant, General Motors vice-president in charge of sales, and chairman of the chamber's sales managers' committee. Mr. Grant indicated that selling problems of common interest to all manufacturers would also be considered during the session.

Trico Reports Profit

NEW YORK, Oct. 21—Trico Products Corp. reports net profit for the nine months ended Sept. 30 of $1,475,124. This is equivalent to $3.93 a share, and compares with earnings of $1,573,005 or $4.19 a share last year.

British Seek Marine Market

NEW YORK, Oct. 22—The following information has been received by the National Association of Engine & Boat Manufacturers from the United States Department of Commerce in a special letter from Trade Commissioner Floyd E. Sullivan, in London:

"According to press reports, strenuous efforts are to be made by Great Britain to obtain a bigger share of the marine engine business of the world. With this in view, Ruston & Hornsby of Lincoln, and R. A. Lister & Co., Dursley, have established a new company—the Ruston-Lister Marine Co. The combined assets of the two concerns behind the company are, with their associated companies, over £6,000,000. The Ruston-Lister Marine Co., Ltd., will enter the market with marine engines for all purposes, including motor boats, yachts, fishing smacks, trawlers, lifeboats, pilot boats and various types of mercantile vessels."

Citroen Advocates Export Cartel

(Continued from page 659)

ers are successfully adapting themselves to this type of manufacture.

"If to all other industries the same progressive methods and spirit will be applied as in the case of the automobile," he said, "the cost of living could be greatly reduced without decreasing wages, thus attaining the desired end of better living conditions throughout the world by increasing individual consumption and suppressing all unemployment."

Advertising as an aid to sales has not yet been developed as it should, due to the fact that during the decade of 1919 to 1929 sales required little effort. Consciousness of the value and importance of the automobile must be instilled into the people from the cradle up so that the future market will be definitely assured. To this end, he sells in France every year some 200,000 toy automobiles which are used for Christmas presents for children.

Not only must the public be educated, but the dealer, who fundamentally is a buyer of used cars, requires a great deal of education in the proper purchase of good cars, he pointed out.

Other speakers at this conference included Dr. Fritz Thyssen, chairman of the United Steel Works of Germany, who spoke on "Steel"; Arthur M. Hyde, Secretary of Agriculture of the United States, spoke on "Agriculture"; Alexander Dana Noyes, financial editor of the New York *Times*, spoke on "Finance"; Dr. Carl S. Von Siemens, chairman of Siemens-Halske of Germany, spoke on "Electricity," and Dr. Wilhelm Cuno, chairman of the Hamburg-American Line, who spoke on "Shipping."

The Case for Confidence—

CINCINNATI, Oct. 19—Steady demand for replacement parts in the automotive field has forced Aluminum Industries, Inc., to expand warehouse distribution facilities in the southeast section with Atlanta as headquarters. Heretofore the Atlanta branch has been the Southeastern distribution point for Permite aluminum pistons exclusively. The company announces the opening of a new branch at 431 Peachtree Street, Atlanta, from which the entire line of its products, manufactured in the factory at Cincinnati and the subsidiary plant at St. Cloud, Minn., will be marketed.

CLEVELAND, Oct. 22—Plans for expansion of activities by the Midland Steel Products Co., Cleveland, were described by E. J. Kulas, president, at a dinner held recently in honor of Harry T. Gilbert, newly named vice-president and general manager of the company.

"Midland has augmented its engineering talent and speeded up its research laboratory work with the result that a number of promising new products in diversified lines have been developed," said Mr. Kulas. "For one of these products, a new axle housing, large orders have been received, and $100,000 of new equipment is being installed for manufacture."

The company is planning to enter other fields, it was stated.

WILLIAMSPORT, PA., Oct. 19—Production capacity of the Lycoming Manufacturing Co., a division of the Cord Corp., will be considerably augmented here with the addition of an entirely new production line and the installation of nearly a half million dollars in new machine and tool equipment. The equipment order, let early last month, is the largest equipment order placed by any automotive manufacturer in many months.

The machine-tool installation includes a complete revamping of the present production line on which the straight-eight engines for the Auburn Automobile Co. are built, and a speeding up of the truck-engine line to meet the increased demand for Lycoming straight-eight truck engines.

A new factory section to contain 48,000 sq. ft. is also under construction.

DETROIT, Oct. 19—An expansion which will result in tripling the capacity of the frame division of the Murray Corp. was to be completed today. Approximately 40,000 sq. ft. have been added to the plant in the shape of a T-section. The leg of the "T" forms an addition to the press line 60 x 240 ft. across the end of which the new frame assembly line runs in a new structure of 80 x 320 ft.

In addition to the extension of the press line, and the new assembly line, a new enameling oven has been constructed through which a conveyor carries the completed frames to the loading dock.

Cost of the expansion is approximately $250,000. The extension of the press line alone calls for the installation of 25 to 30 presses ranging from 75 to 1000 tons in capacity.

DETROIT, Oct. 19—H. A. Douglas Manufacturing Co., Bronson, Mich., has completed the addition of 10,000 sq. ft. of floor space to its plant to house the drafting, engineering and research departments, making room in the space formerly occupied by these divisions for new equipment such as automatic screw machines for increased production capacity.

Soviet Union Notes

From *The Economic Review of The Soviet Union*

A new department for the manufacture of motorcycles was completed recently at the "Red October" factory in Leningrad. It is expected to produce 800 motorcycles this year and 10,000 in 1932.

* * *

The first Soviet magnetos were produced recently by the "Electrozavod" plant in Moscow. These were manufactured entirely from Soviet materials.

* * *

A kiln for the manufacture of automobile glass began operations at the Konstantinovka glass works in the Ukraine on Aug. 5. This furnace will produce glass for the Nizhni Novgorod automobile factory.

* * *

A botanical expedition of the Academy of Science has discovered a number of new rubber-bearing plants and others containing volatile oils. These were found in the Altai Mountains, near the city of Ust-Kamenogorsk.

Making Spring Seats

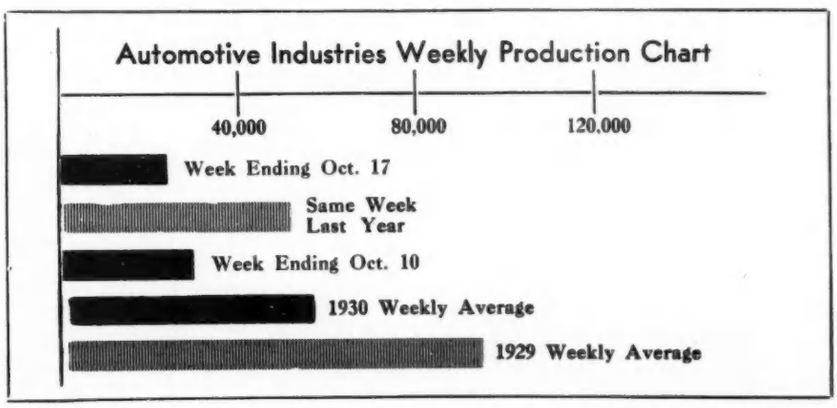
MILWAUKEE, Oct. 19—The K-P Seat Co. has been organized by P. O. Kopplin and C. H. Palmer to engage in the manufacture of a patented spring suspension seat for heavy-duty and semi-heavy-duty motor trucks and tractors, designed to eliminate jolts, jars and road vibrations which cause physical discomfort to the drivers. Production is being instituted in a plant on West Cherry Street. For the present, the production will be absorbed by owners of truck fleets in Milwaukee and nearby points.

Highway Board to Meet

NEW YORK, Oct. 21—Highway Research Board of the National Research Council will hold its eleventh annual meeting at the auditorium in the National Academy of Sciences, Washington, D. C., Dec. 10 and 11.

Buick Poster Wins Prize

CHICAGO, Oct. 17—First prize in the second annual exhibit of advertising art, sponsored by the advertising council of the Chicago Association of Commerce, has been awarded to the Buick Motor Co. The prize is a gold trophy of modernistic design. The Buick prize-winning exhibit was a poster designed by Frederick Stanley for the Campbell-Ewald advertising agency, carrying the caption "Boy, That's Travelling! Buick VIII." E. J. Poag, assistant sales manager in charge of advertising of the Buick Motor Co., received the prize on behalf of the company.



Brainerd, I. C. C. Head, Urges Coordination of Transportation Units in Public Interest

RICHMOND, VA., Oct. 20—Coordination of the newer and older forms of transportation with the object of obtaining from each the maximum of advantage was urged as a national necessity by Chairman Ezra Brainerd, Jr., of the Interstate Commerce Commission, in an address here today before the forty-third annual convention of the National Association of Railroad and Utilities Commissioners.

Dealing with the relationship between rail, motor, water and other forms of transportation, Mr. Brainerd announced that the commission before long will issue its finding with such recommendations for additional legislation as may seem desirable in connection with its investigation of rail-and-motor coordination. Motor transport, he said, is no longer an experiment, but is a national problem which must be so adapted and fitted in as to utilize it to the best advantage. This form of transportation was referred to as playing an important part in the vast changes which are taking place in transportation of the country, but it was declared that railroads are still the chief factors of transportation.

In the desire for faster and more flexible service, Mr. Brainerd said, it is necessary to be careful not to destroy existing transportation systems in which an immense amount of permanent capital is invested, and which must, so far as can be discerned, continue to carry the bulk of the basic commodities.

While it was pointed out that the railroads carry the vast bulk of the country's traffic, Mr. Brainerd presented figures to show that they have been affected adversely by competition of the water lines, pipe lines and motor vehicles, pointing to the registration in 1930 of about 23,000,000 passenger cars and 3,480,000 motor trucks. The figures were said to be sufficient to indicate the amount added in the past few years to transportation service at a time when rail transportation head reached a high stage of efficiency and apparent adequacy.

"It is perhaps not too much to say there is today a surplus of transportation available even if there were no economic depression to reduce loadings," it was stated.

The commercial freight traffic in the United States in 1928, it was said, amounted to 615 billion ton-miles, and in 1929 to 650 billion ton-miles. The percentage of the total for 1929 produced by the various transportation agencies was given as follows: Steam railroads, including electrified operation, 75.8; electric railroad, motor trucks and airplanes, 3 per cent; pipe lines, 4.9; and water-borne traffic, including Great Lakes and inland waterways, 16.3. These were said to be the latest figures obtainable, but it was added that the trend in motor and airway transport has been steadily upward.

It was pointed out that in 1921 a survey made by the United States army transportation experts disclosed that not over 3 per cent of the service of the railroads could be replaced by highway motor transportation and this ratio was said to be estimated by the same authorities as not over 5 per cent at the present time. Declaring that this figure possibly could be greatly increased without creating congestion, and within a comparatively short time, Mr. Brainerd directed attention to an opinion expressed by the chief of the Bureau of Public Roads that the potential capacity of the highways is 100 billion ton-miles, which would be approximately 15 per cent of the commercial freight tonnage moved in 1929 by the several transportation agencies.

"It is not a question of whether any particular form of transportation shall prevail or be given advantage," he said. "Ruthless economic laws will eventually determine that, no matter what artificial impediments may be interposed to interfere with natural progress temporarily. The public interest lies in determining the most economic and efficient transportation service by whatever facilities are best adapted for that purpose. The readjustment of transportation facilities should be made with the least possible economic waste. The ideal situation would be to have every passenger and every pound of freight moved over the most economical route and by the most efficient transportation agency."

Mr. Brainerd drew attention to progress made by the railroads in supplementing their service with motor transportation, either directly, through subsidiaries or by contract with independent motor companies. In 1930, he said, about 80 railroads operated 4000 buses and 60 railroads operated 7000 trucks. The property investment of Class I railroads on June 30, 1930, in motor equipment was said to have been about $40,000,000.

Franklin Improves Fan

NEW YORK, Oct. 19—Franklin Automobile Co. has been developing the cooling fan and has now reached the point where it takes only 4.2 hp. at 300 r.p.m. to cool its engine sufficiently, as compared with requirements of 19.7 hp. in 1929.

Ships Rusco Safety Belts

NEW YORK, Oct. 19—Russell Mfg. Co. has shipped from its St. Johns, Quebec, factory 125 Rusco safety belts to the Department of Aeronautics in Ottawa.

Predicts Increased Gasoline Demand

Increase of 3.7 per cent in the total demand for gasoline during the latter half of 1931 has been predicted by the American Petroleum Institute's Committee on Refinery Statistics and Economics in a report to the board of directors. The committee said it looked for an increase of 5.7 per cent in domestic demand, and a drop of 10 per cent in exports.

The committee estimated a decrease of 2.4 per cent in total demand for crude oil, but reported an expected increase of 6 per cent in exports. Domestic crude oil requirements were placed at an average of 2,393,000 bbl. per day.

Samuel W. Stratton

Dr. Samuel W. Stratton, president of Massachusetts Institute of Technology and formerly director of the National Bureau of Standards, died at his home in the Back Bay District of Boston on Oct. 18. Dr. Stratton was born at Litchfield, Ill., on July 18, 1861, and studied at the University of Illinois, where he took his bachelor's degree in 1881. He continued his studies and received many higher degrees from other institutions later on. While acting as professor of physics at the University of Chicago he became impressed with the need for a national institution for carrying on scientific research. He brought his plan to the attention of Lyman Gage, then Secretary of the Treasury, and Secretary Gage asked him to draft a bill providing for the establishment of such an institution by Congress. This bill was passed in 1901, and Dr. Stratton was placed in charge of the new National Bureau of Standards. Under his efficient management the bureau grew enormously, particularly during the war period. In 1923 Dr. Stratton resigned as head of the bureau to assume the presidency of the Massachusetts Institute of Technology, which position he held until his death. The latter was due to heart failure which occurred while Dr. Stratton was dictating a tribute to the late Thomas Edison.

Pan-Am. Delegates Tour

NEW YORK, Oct. 19—A tour through industrial centers is now being enjoyed by the 45 delegates who attended the Pan-American Union's fourth commercial conference in Washington. Plans include trips through tire and automobile factories, as well as plants of several other industries, and will be lightened to include football games, an international broadcast, and various dinners and luncheons.

Oil Engine Notes

From a correspondent traveling in Great Britain we learn that the A.E.C. Diesel engine, which was originally described in *Automotive Industries* of Oct. 17, has been redesigned chiefly with respect to the form of its combustion chamber, and the bore has been increased from 110 to 115 mm. (4.33 to 4.53 in.), the stroke remaining the same at 5.59 in. The new engine is said to develop 140 hp. at 2400 r.p.m., where the original model barely developed 100 hp. The weight of the engine is 1415 lb., making the specific weight almost exactly 10 lb. per hp., and the fuel consumption claimed is 0.40 lb. per b.hp.-hr.

Mounted on a truck which with load weighed 11½ tons, this engine gave remarkably good acceleration, though the wheels had a diameter of 48 in. and the rear axle reduction was 7 to 1. A speed of 45 m.p.h. was attained in the tests and a maximum of 50 m.p.h. is claimed. This engine burns a very light fuel. For American conditions it would probably have to be redesigned.

* * *

A very smart new oil engine has been developed by Leyland Motors, Ltd., of Leyland, England, which has been fitted in a heavy truck chassis. The whole engine is located forward of the front axle, to make it more accessible. It has a bore and stroke of 4⅝ by 6 in. and develops around 100 hp. The engine has been considerably shortened and has the camshaft drive at the rear end.

Publishes Revised Booklet

NEW YORK, Oct. 19—Motor Vehicle Conference Committee has published a supplementary revision of its 1931 pamphlet on "State Restrictions on Motor Vehicle Sizes, Weights and Speeds." The publication was announced by R. S. Armstrong, secretary of the committee. This supplement presents a record of laws enacted since Jan. 1, 1931, affecting size, weight and speed restrictions on motor vehicles operated in each state.

Motor-Rail Executives Meet

NEW YORK, Oct. 19—Executives of the motor truck industry met last week with the executives of the railroad industry in further attempts to solve joint problems of transportation. While it was indicated that progress was made, no report of the direction in which progress was made was forthcoming from the meeting.

Horizontal Increase in Rail Freight Rates Denied by I. C. C. in Sweeping Decision

WASHINGTON, Oct. 22—In denying the railroads a horizontal 15 per cent increase in rates, the Interstate Commerce Commission decision handed down on Tuesday of the present week took the view so urgently pressed before it at the hearing by protesting shippers that the increase would be harmful rather than helpful to the carriers. They emphasized this contention by declaring the higher rail rates would inevitably divert additional traffic to the motor truck, water line, and pipe line, and the commission likewise accepted this argument as being sound. The commission said it was its conclusion that even if a 15 per cent increase in rates were granted rail revenue would be increased only temporarily and that "its ultimate effect, not very long postponed, would be to harm rather than to help the railroads," and its suggested increased rates on certain commodities was proposed as a temporary measure to run until March 31, 1933, to be continued or discontinued, depending upon conditions then existing. Dealing with competitive motor truck transportation, the commission declared that the railroads had under-estimated it rather than exaggerated it.

"Movement by truck is a new form of competition which has been developing with great rapidity," said the commission. "It has been principally effective on less-than-carload traffic, and relatively short hauls of such commodities as livestock, cotton, cement, sand and gravel, gasoline, fruits and vegetables, and general merchandise; but it is continually extending to more and more traffic, and for longer distances, as trucks and trailers are enlarged and highways improved. At present it is aided by prevailing low prices for gasoline and rubber and the oversupply of labor. In addition to rates, advantages which it offers to the shipper are in rapid and flexible service, store-door receipt and delivery, the transportation at carload rates of much smaller lots than are possible by railroad, and elimination of costly railroad packing requirements. The carriers introduced evidence to show that it would be feasible for the trucks to divert only a comparatively small amount of additional tonnage, even if rates were increased. But without exaggerating the menace of this form of competition, we are convinced that the carriers have underrated it, and that its possibilities are materially greater than they are prepared to concede." The plan of relief proposed by the commission for the railroads is estimated to produce between $100,000,000 and $125,000,000 increased revenue on the basis of present traffic if applied both state and interstate. This, the decision said, should cover deficiencies in interest on fixed interest obligations with a substantial balance left over.

With agricultural products, livestock, fruits and vegetables specifically exempted from increased rates, the proposal of the commission, however, does suggest advanced rates on a long list of specified and unspecified products throughout mining and industry generally. Automobiles, trucks, and automotive products generally would be given higher rates levels if the carriers accept, as it is assumed they will, the suggestions of the commission and file the new schedules on or before Dec. 1, next, conditioned upon approval by the commission of a plan for the division among the carriers of the gross proceeds derived from the increase. The automotive lines, where rates are based on cents per 100 lb., would be increased 2 cents per 100 lb. There are certain provisions surrounding the proposed increases. One is to the effect that the increase levied on any carload shall be in excess of 10 per cent of the carload charges which would be assessed in the absence of the increase. In the case of less-than-carload freight, no increase shall be assessed for hauls for which the rates are assessed on a basis of not more than 175 miles. The increase for hauls over 175 miles and not more than 250 miles shall be 1 cent per 100 lb. Where rates are given in dollars per car and the increase is an amount per 100 lb., the increase shall be $7.50 per car if made on the basis of 1 cent per 100 lb., and $10 if made on the AC basis.

The commission also turns to suggested regulation by Congress and state legislatures of all competitive forms of transportation.

"In this we include such restrictions on the size and weight of trucks and their lading as public safety may dictate, such taxation of trucks and buses as may be necessary to impose upon them a fair share of the burden of the public highways which they use, such supervision of truck and bus common carrier lines as may be necessary to avoid destructive and wasteful competition, and such regulation of their rates and service as the public interest may require. We are here stating only very broad principles, the practical application of which must be governed by the definite ascertainment of facts many of which are now in controversy. Our purpose for the moment is only to direct attention to matters which are in urgent need of legislative consideration. The facts in regard to motor competition we helped to develop some years ago in a report made after special investigation. We hope in the near future to supplement these facts and bring them up-to date, together with specific recommendations for legislation, in a report on the coordination of rail and motor service which is now in progress."

Men of the Industry and What They Are Doing

A.P.I. Names Two

L. S. Bassinet, Standard Oil Co. of California, San Francisco, has been appointed member of the Committee on Automotive Transportation of the Division of Marketing for the American Petroleum Institute. He succeeds H. H. Hall, resigned.

G. C. Noble, Richfield Oil Co., Los Angeles, has succeeded W. M. Neal as a member of the same committee and of the Pacific Coast Group.

A.C.C. Elects Wotowitch

Richard A. Wotowitch of Cities Service Co., New York, chairman of the American Petroleum Institute's Committee on Fire Prevention in Marketing, has been elected chairman of the Executive Committee on Fuels and Lubricants of the Aeronautical Chamber of Commerce.

Kellett Promotes LePage

W. Laurence LePage, formerly chief engineer of Kellett Aircraft Corp., Philadelphia, has been elected vice-president of the company, in charge of engineering. Mr. LePage is chairman of the Philadelphia Section, S.A.E.

Indian Names Marindin

The Indian Motocycle Co., Springfield, Mass., has announced the appointment of Henri L. Marindin as assistant sales manager to replace W. Stanley Bouton, whose resignation was announced recently.

Bakelite Assigns Rector

Bakelite Corp. has assigned C. D. Rector to work on Bakelite resins for brake lining materials. He will travel the entire industrial section of the country, presenting the merits of Bakelite resins.

Nash Promotes Wahlberg

N. E. Wahlberg, chief engineer of the Nash Motors Co., has assumed his duties as vice-president in charge of engineering of the Nash manufacturing organization.

Brown Leaves Continental

Willis C. Brown, director of sales and service for Continental Aircraft Engine Co., Detroit, has resigned to return to his former residence at Tulsa, Okla., where he will organize the Willis C. Brown Co., for the sale of Continental industrial engines, and certain electrical and mechanical specialties for the oil fields.

Mr. Brown, who has been a pilot since 1917, began his business activities in aviation with the design of the Spartan biplane and organization and presidency of that company at Tulsa in 1928. During 1930 he was vice-president in charge of sales of Warner Aircraft Corp., leaving in 1931 to direct the sale of Continental aircraft engines.

Van Sicklen Gets Post

Norton H. Van Sicklen, widely known in the automotive field, has been appointed manager of the Motorists' Athletic Club, which will occupy quarters in the 29-story building now under construction at Michigan Avenue and Twenty-fourth Street, Chicago. Mr. Van Sicklen is known in the publishing and printing business and was manufacturer of the Van Sicklen speedometer, later sold to Stewart-Warner. He was once general manager and later president of Apperson Brothers Automobile Co.

Loomis on Program

NEW YORK, Oct. 22—E. F. Loomis, speaking today before associated industries of Massachusetts in Boston said, "Financial stability of railroads does not require special taxes on other forms of transportation. Railroad problems are the result of their own management and refusal to take advantage of other forms of transportation. Much lost traffic could be regained if proper advantage were taken of motor transportation and the various forms of transportation coordinated."

Chevrolet Names Kirkhope

The appointment of J. L. Kirkhope to be manager of the Chevrolet truck division of General Motors Products of Canada, Ltd., has been announced. Mr. Kirkhope will be in contact with salesmen all across the Dominion through the eight zone offices of General Motors Products of Canada, Ltd.

I.H.C. Reduces Costs

CHICAGO, Oct. 22—International Harvester Co. has increased production schedules from three to four days a week, effected further reduction in salaries, is instituting wage reductions in various plants and has reduced the price of its products. Alexander Legge, president, says: "Following company policy of providing as much employment as possible during winter, most of our plants now increase production. We hope increased operating schedule can be maintained throughout winter months. Our prices for 1932 season, effective Oct. 1, show further reductions besides those of last two years. They reflect every possible economy we have been able to make or anticipate in manufacturing costs."

Canada Plans Wider Aeronautic Research

Canada is at last about to enter the aviation field on more of an even footing with other countries in the matter of research, it was stated before members of the Montreal branch of the Engineering Institute of Canada recently by J. H. Parkin, assistant director of the division of physics, National Research Laboratories, in charge of research laboratories.

"Up to the present, aircraft builders in Canada have been handicapped in their attempts to develop types of aircraft particularly suited to Canada's needs," said the speaker, "because of the lack of experimental facilities. They are placed at a disadvantage in competing with builders in other countries who have had the use of government research equipment.

"Recognizing this, the National Research Council has undertaken to provide equipment for aeronautical research work. There is, under construction, a wind tunnel for aerodynamic studies, a test tank for hydrodynamic work, etc.

Investigations into all other sides of airplane construction will be carried on in other laboratories, he said.

Michigan Sales Rise

DETROIT, Oct. 21—Automobile registrations in Michigan during September totaled 6393, a gain of 18 per cent over the August figure and a decrease of 25 per cent from the September, 1930, total of 8565. Ford registrations were 1679, an increase of 30 per cent over August and a decrease of 54 per cent from the total for September, last year. Chevrolet totaled 1409 in September, compared with 1179 in August and 1507 in September, 1930. Plymouth was third with 1175, a decrease of 14 per cent from the August total. Buick was fourth with 234, Dodge fifth with 228 and Olds sixth with 182.

Commercial registrations totaled 1041 against 617 for August and 1638 for September, 1930. Ford was first with 503, Chevrolet second with 340 and International third with 56.

Perfect Circle Profits

NEW YORK, Oct. 21—Perfect Circle Co. reports net profit for the nine months ended Sept. 30 of $736,475. This is equivalent to $4.53 a share and compares with earnings of $528,515, or $3.25 a share, for the first nine months of last year. Earnings for the September quarter were $241,813, or $1.49 a share, as compared with $160,458, or 98 cents a share for the third quarter of last year.

Range of Stock Prices on the New York Exchange During September*

NAME OF GROUP	COMMON STOCKS					PREFERRED STOCKS				ALL STOCKS			
	No. of Companies	No. of Issues	Average Price	Total Shares Listed	Total Market Value	No. of Issues	Average Price	Total Shares Listed	Total Market Value	No. of Issues	Average Price	Total Shares Listed	Total Market Value
Automobile & Truck Mfg. Co.'s (and Holding Co.'s)	23	23	$15.58	83,740,206	$1,304,503,777	7	$77.09	2,377,875	$183,298,582	30	$17.28	86,118,081	$1,487,802,359
Automobile Access. Mfg. Co.'s (and Holding Co.'s)	35	35	9.10	22,255,895	202,633,192	5	35.24	297,409	10,481,096	40	9.45	22,553,304	213,114,288
AUTOMOBILE INDUSTRY.....TOTAL	58	58	14.22	105,996,101	1,507,136,969	12	72.43	2,675,284	193,779,678	70	15.65	108,671,385	1,700,916,647
AIRPLANES-A'WAYS-A'PORTS.TOTAL	9	9	5 92	16, 73,862	97,602,288	2	9.50	1,380,433	13,111,083	11	6.20	17,854,295	110,713,371
FARM MACH'NERY INDUSTRY.TOTAL	7	6	18.48	8,086,516	149,428,743	5	43.56	3,140,764	136,819,969	11	25.50	11,227,280	286,248,712
RUBBER T.RE & GOODS IND'Y.TOTAL	8	8	9.11	9,621,454	87,614,663	10	36.32	2,661,429	96,673,995	18	15.00	12,282,883	18 1,288,658
Omnibus Operating Co.'s	3	3	6.48	1,085,137	7,028,530	1	62.50	88,729	5,545,563	4	10.71	1,173,866	12,574,093
Petroleum & Natural Gas Co.'s	42	44	14.09	168,307,923	2,370,981,706	12	37.25	2,215,962	82,553,093	56	14.39	170,523,885	2,453,534,799
Petroleum & Natural Gas Holding Co.'s	3	3	6.31	3,505,959	22,137,437	...	....	.....	.....	3	6.31	3,505,959	22,137,437
PETROLEUM INDUSTRY .....TOTAL	45	47	13.93	171,813,882	2,393,119,143	12	37.25	2,215,962	82,553,093	59	14.23	174,029,844	2,475,672,236
Light Machinery & Metal Products Mfrs.	44	47	14.80	37,515,859	555,196,965	20	56.27	2,062,405	116,0 5,662	67	16.96	39,578,264	671,242,627
Heavy Machinery & Metal Products Mfrs.	15	16	12.12	8,710,837	105,614,540	11	32.66	1,023,290	33,421,447	27	14.28	9,734,127	139,035,987
MACHINERY & METAL INDUSTRY, TOTAL	59	63	14.30	46,226,696	660,811,505	31	48.44	3,085,695	149,467,109	94	16.43	49,312,391	810,278,614

*October Bulletin of the New York Stock Exchange

A. W. Childs Cites Export Promise

CHICAGO, Oct. 21—A growing premium on swift and convenient transportation, such as furnished by the motor car, assures the automobile industry of a promising future as soon as general economic conditions improve, A. W. Childs, chief of the automotive division of the Department of Commerce, told exporters of automotive products here yesterday. The manufacturers, here for a two-day conference, were told that a considerable number of the world's 35,000,000 automobiles are due to be replaced.

"The great economic importance of motor transportation throughout the world must eventually be reflected in a strong demand for new automobiles to replace those worn out," he said.

"With low inventories, the industry is in a position to enjoy fully and immediately any improvement in buying," he continued, "the effect of trade revival will be communicated quickly to the factory and transmitted into stimulated production and increased employment.

"In the six-year period from 1925 to 1930, exports of automotive products from the United States produced the tremendous revenue of more than $2,280,000,000. This export business provided work for tens of thousands of employees, thousands of plants, extended a far-reaching beneficial influence upon our economic life, and provided both a stimulus and a stabilizing force in one of the world's largest and greatest industries.

"The growing interest of foreign countries in highway development is striking proof that they are planning their future with a view to the continued development of automotive transportation. It follows that these markets will present promising sales opportunities for the world's manufacturing countries.

"Unless we are willing to deny the future of motor transportation, we must recognize the great opportunities which must present themselves sooner or later in the automotive field both at home and abroad."

Ford Calls Depression Wholesome

NEW YORK, Oct. 22—Depression has been a wholesome thing in general, Henry Ford declares in the November issue of the *American Automobile*, a publication affiliated with *Automotive Industries*. He says there will be no recession in living standards as a result of the hard times. He predicts that the sale of automobiles will increase and urges the continuance of high rates of pay. He refuses to be alarmed by world surpluses. The evil of surpluses is almost counterbalanced by the good results from them. Surpluses forced persons to develop new uses for goods in order to dispose of them. The present hard times may last a long time in some of its various phases, but a revision of our present system would bring prosperity, he concludes.

Offer New Switches

DETROIT, Oct. 22—Two new lighting switches for original equipment and service installation have been announced by H. A. Douglas Manufacturing Co., Bronson, Mich.

The first is a foot-control switch which controls not only the up or down movement of the headlight beam, but also serves as the main switch for head and tail lights. The first depression of the foot switches on the bright lights, another push depresses the beam, another brings back the upper beam.

The second electrical control is a four-way dash switch for body lights, the various positions being for dash, courtesy and parking lights and the off position.

Doehler and Bohn Exchange

DETROIT, Oct. 20—Doehler Die Casting Co. and Bohn Aluminum & Brass Corp. have agreed on a plan under which the Doehler Die Casting Co. takes over the die casting division of Bohn Aluminum in exchange for Doehler's permanent mold department.

Nash Consolidates Assembly Plants

MILWAUKEE, Oct. 19—To effect material economies in manufacturing, The Nash Motors Co. has closed its Milwaukee branch factory and is transferring the production line to the main works at Kenosha, Wis. The Milwaukee plant was built about ten years ago and, at its peak in 1929, employed 2200. During the past year it manufactured the Nash 8-80 model. The branch factory at Racine, Wis., where the six-cylinder model is built, is not affected, although the purchasing, accounting and traffic departments are being consolidated at Kenosha. The Seaman Body Corp., Milwaukee, in which Nash owns a half interest, will continue to build all of the Nash enclosed body requirements. A formal statement regarding the discontinuance of production at the Milwaukee Nash branch factory remarks upon the fact that the forgings, stampings, castings and some of the bodies are produced in Kenosha and trucked to Milwaukee. The consolidation of production will eliminate this heavy expense. Consolidation of all purchasing, accounting and traffic at Kenosha likewise is designed to effect a substantial saving.

Hudson Reports Loss

DETROIT, Oct. 22 — Hudson Motor Car Co. reports net loss of $1,075,136 for the quarter ending Sept. 30, after depreciation, comparing with net profit of $300,597 in preceding quarter and net loss of $2,078,165 in third quarter last year. The net loss for nine months was $548,144 against net profit of $1,313,847 for the first nine months, 1930. The company states that notwithstanding the above, Hudson's fine cash position is unimpaired and its liquid condition has been improved since the beginning of the year.

Chrysler Sixes Gain

DETROIT, Oct. 22—September retail deliveries of Chrysler Sixes showed a gain of 56.2 per cent as compared with the same month last year.

Steel Market Steady in Tone

Possibility of Concerted Buying Rush in Future is Seen

By William Crawford Hirsch

NEW YORK, Oct. 22 — If October, now drawing to a close, has not perceptibly altered the picture which the steel market presented at the close of summer, it has also in no wise impaired the hopeful attitude of producers. Heretofore this consisted of expectancy of a slow, but gradual, gain in bookings. Many now express the opinion that when the change for the better does set in, it will more likely take the form of a concerted buying rush.

In some quarters, it is thought that the market in November and December may run contrary to form, these two months being usually dull in normal years, but in the opinion of most producers not much of a change is to be expected during the remainder of the year, but a decisive one in the first quarter of 1932. Finishing mills continue to fare slightly better than those producing the primary forms of steel.

September sales of sheets, according to a report of the National Association of Flat Rolled Steel Manufacturers published this week, totaled 120,688 tons against 122,849 tons in August and 214,454 tons in Sept., 1930. Sales represented approximately 33 per cent of capacity. Unsold stock at the end of September was 67,337 tons, compared with 75,288 tons at the end of August. Backlog of sheet mills at the beginning of October was 45.8 per cent of capacity.

While some automotive consumers are taking sheets and strip-steel more freely, others are still out of the market. Prices all along the line are unchanged with the market's tone characterized as steady.

Pig Iron—Resumption of operations by one of the large Michigan automotive foundries was an encouraging factor in the otherwise drab market. While quotations are nominally unchanged, the tone of most markets is soft.

Aluminum—Routine conditions prevail with the automotive demand fair.

Copper—With the arrival of spokesmen for the Belgian owners of the Katanga mines in South Africa, the conferences of producers aimed at a curtailment of output are in earnest. The market is steady at 7 cents, delivered Connecticut Valley, and 7⅛ cents, delivered Middle West.

Tin—Exchange fluctuations cause the tin market to seesaw from day to day. Spot Straits was held at 22¾ cents at the opening of this week.

Lead—Quiet and steady.

Zinc—Dull and easy.

Peerless to Depreciate Stock

NEW YORK, Oct. 19—Peerless Motor Car Corp. has notified the New York Stock Exchange of its intention to reduce the par value of its 750,000 shares of capital stock from $10 to $3 a share.

+ + CALENDAR + + OF COMING EVENTS

SHOWS

Olympia Passenger Car Show, London .....Oct. 15-24
Olympia Truck Show, London..Nov. 5-14
Passenger Car Show, Glasgow..Nov. 13-21
Salon, New York City.....Nov. 29-Dec. 5
Motorcycle Show, London..Nov. 30-Dec. 5
National Automobile, New York..Jan. 9-16
San Francisco, Automobile.....Jan. 16-23
Newark, N. J., Automobile.....Jan. 16-23
Cincinnati, Automobile .....Jan. 17-23
Milwaukee, Wis., Automobile...Jan. 17-23
Philadelphia, Automobile .....Jan. 18-23
Louisville, Ky., Automobile....Jan. 18-23
Boston, Mass., Automobile.....Jan. 23-30
Minneapolis, Minn., Automobile.Jan. 23-30
Hartford, Conn., Automobile...Jan. 23-30
Detroit, Automobile .....Jan. 23-30
Montreal, Automobile .....Jan. 23-30
Baltimore, Automobile .....Jan. 23-30
Pittsburgh, Pa., Automobile...Jan. 23-30
St. Petersburg, Fla., Automobile, Jan. 28-31
National Automobile, Chicago, Jan. 30-Feb. 6
Salon, Chicago .....Jan. 30-Feb. 6
Washington, D. C., Automobile Jan. 30-Feb. 6
Cleveland, Automobile ....Jan. 30-Feb. 6
Springfield, Ill., Automobile.....Feb. 4-6
St. Paul, Automobile.....Feb.6-13
St. Louis, Automobile .....Feb. 7-12
Denver, Colo., Automobile.....Feb. 8-13
Peoria, Ill., Automobile.....Feb. 9-14
Salon, Los Angeles, Calif.....Feb. 13-20
Kansas City, Automobile.....Feb. 13-20
Mankato, Minn., Automobile...Feb. 17-20
Holyoke, Mass., Automobile...Feb. 18-22
Des Moines, Ia., Automobile...Feb. 21-26
Wichita, Kans., Tractor and Power Equipment .....Feb. 23-26
Salon, San Francisco, Calif..Feb. 27-Mar. 5

CONVENTIONS

American Railway Assn.—Motor Transport Division, Chicago.....Oct. 27-28
Transportation Meeting, S.A.E., Washington, D. C. .....Oct. 27-29
National Association of Finance Companies, Chicago.....Nov. 17-18
American Society Mechanical Engineers—Annual meeting, New York City .....Nov. 30-Dec. 4
American Roadbuilders Association, Detroit, Mich. .....Jan. 11-14, 1932
S.A.E. Annual Dinner, New York City, Jan. 14
S.A.E. Annual Meeting, Detroit, Mich., Jan. 25-29

S.A.E. LOCAL MEETINGS

Baltimore .....Oct. 27-29
Washington, D. C. .....Oct. 27-29

To Distribute Foreign Cars

NEW YORK, Oct. 21—Two additional foreign cars will be available for sale in the United States with the announcement that A. J. Miranda, Jr., Inc., New York, has been appointed American distributor for the Delage (French) and Maybach (German) lines. Both lines will carry coachwork by Carossorie Fernandez of Paris, and both will be exhibited at the Automobile Salon in New York. The Miranda organization has been metropolitan distributor of duPont automobiles for several years, and will continue with this line.

Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for Automotive Industries

NEW YORK, Oct. 21—Reports from some quarters indicate that business sentiment is somewhat more hopeful, although there has been no marked improvement in business. Retail trade is showing a more confident tone with the increased sales of clothing brought about by the approach of winter. The slight improvement in wholesale trade last week consisted of small orders for urgent needs. Collections were slow throughout the country, although there was some slight improvement in the East.

GUARANTY INDEX

The Guaranty Trust Company's preliminary index of business activity for September stood at 62.4, as against 63.7 for the preceding month and 80.4 a year ago.

DEP'T STORE SALES

The index of department store sales for September, according to the Federal Reserve Board, stood at 84, as against 88 for August and 91 for July. This index is adjusted for seasonal changes and allowance is made for the number of business days in each month.

CHAIN STORE SALES

Sales of 41 store chains during September amounted to $234,670,652, as against $242,492,598 a year ago. Sales of three mail order houses during September totaled $44,513,096, as against $52,211,682 a year ago.

CONSTRUCTION CONTRACTS

Construction contracts awarded during September in 37 Eastern states, according to the F. W. Dodge Corp., amounted to $252,109,700, as against $331,863,500 a year ago. Contracts awarded in the first nine months of this year totaled $2,563,707,800, as against $3,683,399,000 a year ago.

FREIGHT LOADINGS

Railway freight loadings during the week ended Oct. 3 totaled 777,837 cars, the highest weekly total this year, which marks a decrease of 193,418 cars below those a year ago and a decrease of 402,110 cars below those two years ago.

WHOLESALE PRICE INDEX

The Guaranty Trust Company's index of wholesale commodity prices stood at 44.2 on Oct. 15, as against 47.0 a month earlier and 60.0 a year ago.

FISHER'S INDEX

Professor Fisher's index of wholesale commodity prices for the week ended Oct. 17 stood at 68.2, as against 68.1 for both the week and two weeks before.

BANK DEBITS

Bank debits to individual accounts outside of New York City during the week ended Oct. 14 were 28 per cent below those a year ago.

STOCK MARKET

The stock market last week was under pressure after a week of strength. A slight recovery at the end of the week wiped out some of the losses, and prices for that period were irregularly changed.

BROKERS' LOANS

Brokers' loans in New York City during the week ended Oct. 14 declined $73,000,000, bringing the total down to $928,000,000.

RESERVE STATEMENT

The consolidated statement of the Federal Reserve banks for the week ended Oct. 14 showed increases of $165,000,000 in holdings of discounted bills and of $149,000,000 in holdings of bills bought in the open market. Holdings of Government securities declined $11,000,000. The Reserve ratio on Oct. 14 was 61.8 per cent, as against 67.1 per cent a week earlier and 71.7 per cent two weeks earlier.

BARBER-COLMAN

QUALITY SHELL REAMERS

Because they are made with the accuracy and finish which characterizes all Barber-Colman Small Tools, our Inserted Blade Shell Reamers are of much higher quality than the usual commercial product. Our individual style of blade mounting generally provides more blades than other reamers. These blades are securely held for practically their entire length in the blade slot by the patented pin and wedge construction peculiar to Barber-Colman Inserted Blade Reamers. These Reamers cannot chatter, nor will the blades rock in the work. They may be accurately resharpened to their original size many times, having a blade adjustment of from .039″ to .260″. We make them in straight and spiral blade types from 1 3/16″ to 6″ diameter, by sixteenths, and can ship all sizes promptly from stock.

BARBER B-C COLMAN

BARBER-COLMAN COMPANY

General Offices and Plant

ROCKFORD, ILLINOIS, U. S. A.

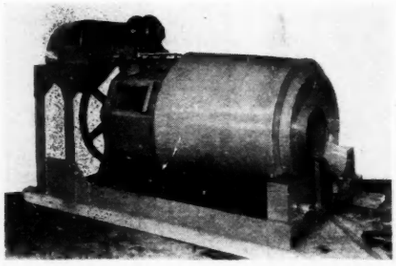
NEW DEVELOPMENTS

Automotive Parts, Accessories and Production Tools

Ideal Burnishing Barrel

A new departure in burnishing equipment which results in a saving in time and labor, a better finish of the work and a definite and substantial reduction in burnishing costs has been placed on the market by N. Ransohoff, Inc., Cincinnati, Ohio.

The saving in time and labor is accomplished by a method of unloading the barrel, automatic separation of the balls from the work and automatic



return of the balls to the burnishing compartment. The work is loaded into the Ideal barrel through a door in the periphery somewhat as in the case of the standard barrel where the diameter is greater than the length. A cylindrical screen is attached to the end of the burnishing section and connected to it by a suitable passage of patented design. This screen is surrounded by a cone for retaining the balls after separation from the work and this cone is connected to the burnishing compartment by a patented passage.

After the burnishing has been completed, reversing the direction of rotation discharges the work and the balls into the screen. Here the balls are separated from the work, the former falling through the perforations in the screen into the surrounding cone and the latter passing out from the end of the screen. The barrel is then stopped and loaded with another batch of work. Running again in the burnishing direction automatically returns the balls from the cone to the burnishing section. This automatic handling of the balls eliminates all the labor of handling them, and the time required to empty and reload the Ideal barrel is about five minutes as compared to 30 minutes for the old-type barrel, where manual separation of the balls from the work and manual return of them to the barrel are required. In addition to this great saving, a greater quantity of balls can be used than is economical in the old-type barrel. This results in a faster and better burnishing action.

Power is from a 720 r.p.m. motor through V-belt drive and cut gear and pinion. Built in several sizes and perforations in screen of proper size to accommodate work.

Lucas No. 53 Horizontal Boring Machine

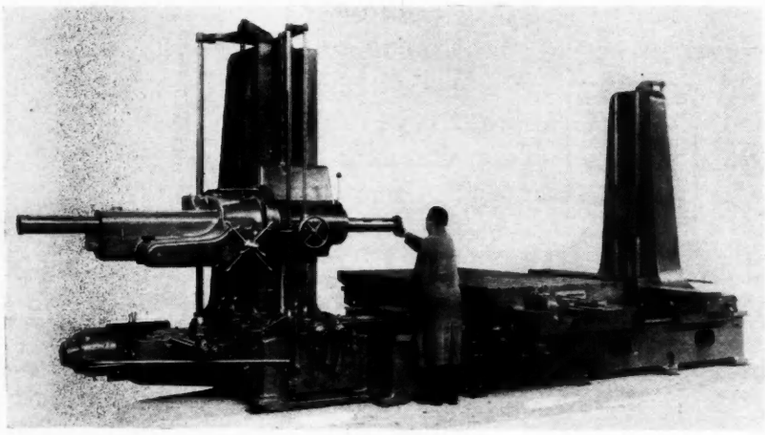
The Lucas Machine Tool Co., Cleveland, Ohio, has announced the new No. 53 machine, designed to answer the growing demand for greater cross adjustment and vertical range.

One of the applications of this machine is in milling automobile body dies, in which it is convenient to have the hand feed crank for cross adjustment of the table located at the left side of the saddle, where the operator can stand naturally and watch the cut. The great range of this machine makes it suitable also for boring and milling Diesel engine crankcases and enbloc cylinder castings and maintenance work.

To maintain alignment, the table is properly supported, so it will not sag appreciably in the extreme positions of its travel, by a long, deep saddle and a wide bed. The bed measures 60 in. across the outer ways, giving proper support to the saddle and table and yet not making it inconvenient for the operator to reach the tools in the bar, because recesses provide toe room, permitting him to stand erect.

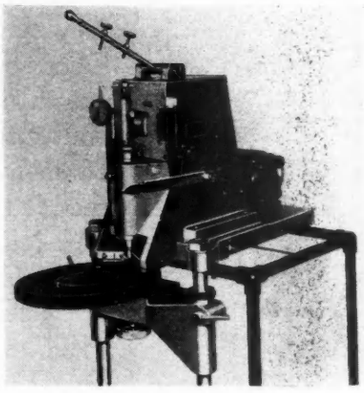
The motor-driven machine shown has the standard height column and backrest giving 60 in. maximum distance from center of spindle to top of table, which is of the 60 in. widened pattern of standard length. The bed is of 4 ft. extra length taking 12 ft. between faceplate and outer support, and the auxiliary table, with slide for supporting long work overhanging the right side of the main table or platen, is shown in position on the bed, between the main table and the backrest.

Recommended motor size is 15 or 20 hp.



The Grade-O-Meter

The Grade-O-Meter, manufactured by the Abrasive Engineering Corp., Detroit, Mich., is designed to indicate the grade and uniformity of structure of grinding wheels in figures suitable for comparison and future guidance in the selection and specification of grinding wheels. It drops a weighted point (which may be compared to a deep-



well drill) onto the grinding wheel to be tested a certain number of times, and then measures the depth of the hole in the surface of the grinding wheel which has resulted therefrom. The depth of the hole is a criterion of the hardness of the wheel and serves as a standard for comparison and selection of grinding wheels.

(Turn to page 670, please)

J & L COLD HEADING WIRE

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Galvanized Barbed Wire
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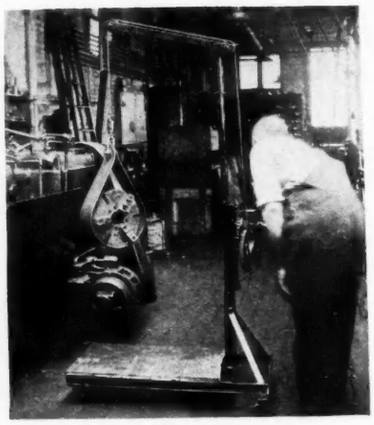
Economy Chuck Hoist

The Economy Engineering Co., Chicago, announces a new hand-operated chuck hoist.

The lift is light and easy to move around in congested places, the base measuring 20 in. in width by 40 in. in length, with 3-in. diameter wheels, those at the rear mounted on swivels and those at the front end fixed. The top of the boom is 76 in. above the floor, enabling the chuck to be raised high enough for any ordinary lathe. The saddle for the chuck is 6 in. in width and large enough to accommodate chucks of the size ordinarily weighing up to 200 lb.



Economy Chuck Hoist

New "Fleetweld" Electrode

The Lincoln Electric Co. of Cleveland announces the introduction of an improved, heavily coated electrode for welding within the shielded arc on mild steel. Like its predecessor, this electrode will be known commercially as "Fleetweld."

It is claimed that the new electrode insures a higher ductility of weld metal, 20 to 30 per cent elongation in 2 in.; that tensile strength of coupons is increased about 10 per cent, averaging between 65,000 and 80,000 lb. per sq. in., and that the resistance to corrosion is greater than with mild steel.

Automatic Clutches Seen As Next Logical Development

(Continued from page 646)

motion of the clutch engagement mechanism.

The writer is not aware of the steps that are being taken to meet this problem by manufacturers considering the adoption of free-wheeling, vacuum-operated clutches. One method which suggests itself is a synchronizing clutch embodied within the clutch proper, similar in operation to that used in synchromesh transmissions. An additional by-pass in the control mechanism which slows up the clutch engagement, permitting the clutch plates themselves to act as synchronizers, is also within the realm of possibilities.

The sixth consideration, freedom from drag, is included here mainly as it bears a relation to the requirements for rapid disengagement and variation in engagement rate requirements. Freedom from drag is, of course, essential to efficient free wheeling.

While satisfactory shifts can be made in a clutch relatively free from drag if sufficient time is allowed for the gear train and driven plate to reach synchronous speed, it is the writer's opinion that synchromesh transmissions are highly desirable, if not essential, for use with an automatic clutch installation.

Regarding actual changes in engagement characteristics of the clutch facings, as a result of service, it is evident that some adjustment will have to be provided to vary the clutch engagement. Whether this adjustment should be arranged so that the owner can make it, or whether it should be left to the service station is an interesting question.

One item that has been rather generally overlooked in service installations of vacuum-operated clutches is the chance of pinching the left foot between the clutch pedal and the floor board. Either the automatic mechanism should actuate the clutch independently of the clutch pedal, or else care should be taken to so design the pedal or to so locate it as to make this impossible.

It is not to be concluded, however, that a fairly satisfactory installation in the service field cannot be made without perfectly meeting all the above and other considerations. It is only when the vacuum-operated or the automatic clutch generally is considered in the light of the evolution of the automobile's amidships section, that these considerations become of paramount importance. In this evolution the automatic clutch has a definite place, for without it it is quite possible that the introduction of semi-automatic or preselective-shift transmissions, or even infinitely variable torque or power converters, would be seriously handicapped, whether or not a master clutch were used with them. It is the writer's opinion that if all of the major problems involved in the automatic clutch can be satisfactorily solved, without undue complication and at reasonable cost, the transmission requiring little or no manual shifting will appear as original equipment within the next 18 months.

Thomas Edison Dies in Sleep

(Continued from page 647)

Edison's. The Edison Machine Works of Schenectady, N. Y., which manufactured electric generators, motors and related apparatus, was later merged with several other electric manufacturing companies in the General Electric Co.

During the latter part of his life Edison spent a good deal of his time in Florida, and one of the problems with which he occupied himself there was the development of a rubber-latex-yielding plant suitable for cultivation in that climate. This evidently was suggested to him by his association with Henry Ford and Harvey Firestone, and by the dangers which at one time seemed to threaten the American automobile industry by foreign attempts to control the production of rubber.

Edison was an outstanding representative of the class of successful professional inventors in the United States. He enjoyed few advantages in early life, and his education was meager. His success was due to the combination of a love of experimental work, a keen insight into natural phenomena, great capacity for work, a practical viewpoint, and an appreciation of and the ability to turn to his own advantage "the power of the press."